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DISSERTATION ON THE STATE OF

MEDICAL SCIENCE,

FROM THE TERMINATION OF THE EIGHTEENTH CENTURY TO THE
PRESENT TIME.

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DISSERTATION ON THE STATE OF MEDICAL SCIENCE,

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CHAPTER I.

Introductory observations—Importance of Comparative Anatomy and Physiology, as extending the foundations of medical science—Misapprehensions involved in the general principles of Hoffmann and Cullen—Improvements recently effected in the physiology of the essential conditions of life in the higher animals—in the physiology of the Nervous System—in other departments of physiology—Vital changes in the fluids, as well as in the solids, must be held to be ultimate facts in physiology and pathology.

In attempting to give a general view of the most important changes of doctrine and improvements of medical science which have been made since the close of the last century, as well as of the leading facts which have engaged the attention of the profession during that time, we do not hesitate to acknowledge our strong sense of the extent and difficulty of the undertaking, but trust that our remarks will be received with candour and impartiality.

The First Lines of Dr. Cullen and the Treatise on the Blood, &c. by Mr. Hunter, may be held to be the most important systematic works on medical subjects which were published, in Britain, during the latter part of the eighteenth century; and all the additions to medical knowledge, and improvements in the principles of medicine, which have been made since they were published, may be included in such a review of the recent progress of the science.

When we compare the general notions as to medical science which are prevalent at the present day, with those which are recapitulated by Dr. Cullen in the Introduction to the last edition of his First Lines, as holding their place, up to his time, in the schools of medicine, the most important observation that occurs to the mind is the present general, although not always avowed, recognition of this principle,—That the phenomena of disease, like all other phenomena of living bodies, belong to a class of facts, and constitute a subject of investigation, altogether distinct from those which are presented by any forms or changes of inanimate matter. Dr. Cullen states that “the Mechanical Philosophy had been applied (soon after the discovery of the circulation) towards explaining the phenomena of the animal economy, and continued till very lately to be the fashionable mode of reasoning on the subject;” and he very properly admits that it must “still in some respects continue to be applied,” but adds that “it would be easy to shew that it neither could, nor ever can be, applied to any great extent in explaining the animal economy.” Now an important step has been already made in the progress of medical science, when this proposition has received the general assent of the profession,—and when the study of Mechanical Philosophy is recommended to the student of medicine, not as one of the foundations of medical science, (with the exception of a few simple applications of its principles in some parts of Physiology,) but simply as an example of successful scientific investigation.

A nearly similar observation may be extended to the study of Chemistry; for although it be true that all vital actions are attended by, and in part dependent on, a series of continual chemical changes, and although a certain knowledge of chemical principles is therefore required of the physiologist, yet the chemical changes of

animated nature are as distinct from those which we produce at pleasure in dead matter, as the stimulation by nerves and the contraction of muscles are distinct from any of the principles and powers of mechanics. Excepting in its application to the *Materia Medica*, the chemistry of dead matter avails little in the science of Medicine; and although little progress has yet been made in the inquiry, it has become obvious that the chemistry of living matter is, in fact, one of the departments of Physiology, the peculiar laws of which must be studied and ascertained in living bodies themselves, and in the products of their vital changes. The chemical part of the changes that take place in respiration, and in the digestion and assimilation of food, has been carefully and successfully investigated of late years; but the result is, that merely chemical principles are equally inadequate for the explanation of those changes, and of their effects on the system, as merely mechanical principles are for the explanation of the movements which, in the economy of the higher animals, are equally essential parts of these functions.

It is farther obvious, that all those functions of living bodies which are now properly distinguished as the *animal* functions, i. e. all those which necessarily imply the intervention of some mental act, can derive no elucidation from any thing that is ever seen in the inanimate world; and that, in so far as the science of medicine is dependent on the knowledge of them, it must be built on observations made on the living state of animals exclusively.

Although, therefore, some degree of acquaintance with other natural sciences is properly expected of a physician, yet it is chiefly as an exercise of the understanding that the study of these sciences must be recommended. The direct applications of any parts of the knowledge derived from that study, either in the science or practice of medicine, are very partial; and the cultivation of that knowledge is chiefly desirable, "not for the sake of the fruits, but to be ploughed in as a dressing to the soil."

It remains, therefore, as the only rational foundation of medical science, that we must trust to the careful examination of the structure and functions of living bodies themselves, as existing in health, as altered by injury or disease, and as influenced by remedies. It is by accurate observation and careful generalization of facts confined to this department of nature itself, that the general principles or Laws of Vitality (whether in the state of health or disease) are ultimately to be made out, which will bear the same relation to the science of medicine, as the principles of gravitation, of the inertia of matter, of motion communicated by impulse, &c. bear to mechanical philosophy; or as the laws of heat, of electricity, and of chemical affinity bear to chemistry.

But in order that this may be effectually done, it is now generally admitted that an extension must be given to the inquiry which has not until lately been in the contemplation of most medical inquirers. It is only by tracing the varieties of organization and of vital phenomena throughout the different orders of animals, and even in vegetables, that we can expect to be able to ascertain the most general laws of vitality, and distinguish them from the conditions of existence of individual families or genera: it were easy to shew that limited and erroneous ideas have originated from the attention of medical inquirers being fixed on the economy either of the human body or of those animals only, which approach the nearest to man; and that the true foundation of medical science must be laid in an extensive knowledge of anatomy and physiology, *human and comparative*. The clear perception of this truth has been gradually impressed on the medical inquirers of the present age, chiefly by the influence of the labours of John Hunter in this country, of Blumenbach in Germany, and of Cuvier in France; and the great, though hitherto unfinished work of Tiedemann may be quoted as evidence of the form and extent which have thus been given to medical science. It must, however, be admitted, that in the writings of professed comparative anatomists much talent and ingenuity have been fruitlessly exerted in questions as to the analogies of structure to be traced in the different classes of animals, which have no bearing on strictly physiological or medical inquiries.

In the systematic writings of Hofmann and Cullen "the state and affections of the *primary moving powers* of the animal economy," as distinguished from any principles of chemistry or mechanics, were first regarded as the main objects of inquiry in the investigation of diseases; and the proper path of pathological inquiry may be said, therefore, to have been opened by these authors. But it will now be pretty generally admitted, that these moving powers of the animal economy, so long neglected in the

older schools of medicine, were erroneously conceived by them. Hoffmann, in a passage which is quoted by Cullen as giving the best epitome of his doctrines, asserts, “ quod solus *Spasmus*, et simplex *Atonia*, aequabilem, liberum, ac proportionatum sanguinis omnisque generis fluidorum motum, quibus excretionum successus et integritas functionum animi et corporis proximè sistitur, turbando et pervertendo, universam vitalem oecconomiam subruant et destruant; atque hinc universa Pathologia longe rectius atque facilius *ex vitio motuum microcosmorum in solidis*, quam *ex variis affectionibus vitiosorum humorum*, deduci atque explicari possit; adeoque omnis generis ægritudines internæ ad *præternaturales generis nervosi affectiones* sint referendæ.” Now this passage plainly implies two propositions, which were maintained by Cullen as well as by Hoffmann, and formed an essential part of the system of both, but which subsequent inquiries have shewn to be not only hypothetical, but most probably erroneous,—viz. *first*, that all movements of fluids in the living body depend on the impulse of moving solids; and *secondly*, that all movements of living solids depend essentially on the nervous system.

In opposition to these ideas of the “ moving powers of the animal economy,” two propositions may be stated as very prevalent opinions, if not generally admitted principles, at the present day:—

1. That, although the principle of *voluntary motion* certainly resides in the Nervous System, yet the supposition of the principle of *all vital motion*, or as some have expressed it, the principle of life itself, being lodged exclusively in the Nervous System, is an unfounded hypothesis; and, 2. That the fluids of living bodies are liable to movements, or variations of movement, peculiar to their living state, but independent of any impulses which they receive from the solids.

The first of these propositions is the general result of the inquiry as to the relation of muscular motion to the nervous system of animals, which was begun in the last age by Haller and Whytt, and continued in the present chiefly by Bichat, Legallois, and Flourens in France, and by Cruickshanks, Brodie, and Wilson Philip, in this country. It has been clearly shewn, indeed, that the involuntary motions of the body, and the property of Irritability itself, resident in the muscular fibres, are *liable to much alteration* from causes acting in the Nervous System; but there is not only good evidence against the hypothesis of their *dependence on an influence or energy constantly flowing into the muscles through the nerves*, but no satisfactory evidence that any intervention of change in a nerve is necessary, to enable a stimulus to act on a muscle.

The second proposition, stated above, is the general result of many observations made on different classes of living beings, and particularly on the movements in the capillary vessels of vertebrated animals, by Haller and by various physiologists and pathologists, chiefly in Germany, since his time. These observations have, perhaps, hitherto attracted less attention in this country than they deserved; but many facts might be stated to shew, that no powers of contraction which can be either attributed to the smaller vessels of animals from what is known of the larger, or detected by microscopical examination of the small vessels themselves, will suffice to explain those fundamental changes, as to the distribution of the blood through the capillary vessels of the body, which led both Hoffmann and Cullen to look to a disordered action of these vessels as the true origin of the most important diseases.

It is easy to perceive that these alterations in the views of physiologists as to the “ primary moving powers of the animal economy,” must necessarily involve a most material change in any speculations which we can entertain as to the fundamental nature of diseased actions.

It may be added that another principle, which held an important place in Pathology even in the writings of Cullen, and likewise, in a somewhat different form, in those of Hunter, has since been very generally and properly abandoned. This is the principle of the Autocrateia, or *Vis Naturæ Medicatrix*, not indeed regarded by Cullen as it had been by Stahl, as an attribute of the human mind, but still held out as a power of the animal system, to which changes occurring in the course of disease might be reasonably referred, and by which they might be explained.

It is perfectly true that the greater number of diseased actions are essentially temporary in their nature, and that there are various and wonderful provisions of nature for avoiding and repairing injuries, to which the body is liable; but unless we sub-

stitute *final* for *physical* causes,—the “*id propter quod*” for the “*id ex quo*,”—the knowledge of this general fact gives no assistance in tracing the laws of the animal economy, to which either these or other changes, occurring in disease, are to be ascribed. The critical termination or gradual decline of idiopathic fever, the resolution of inflammation, the exudation and organization of lymph on inflamed surfaces, the processes of suppuration and of sloughing, the function of healthy absorption, and the increase of absorption from pressure, are all examples of changes which frequently, although not uniformly, tend to the preservation of life; but it is quite certain that these different processes depend on very different principles or laws of the animal economy; and the knowledge of the fact, that these different laws are wisely designed for the preservation of life, gives no assistance in the inquiry as to the nature of the laws themselves, which is the inquiry that the pathologist has to pursue.

It must be owned, however, that although, in these different respects, we may hope that medicine is cultivated on sounder principles at present than fifty years ago, yet as there has been no strictly systematic writer of high repute since the time of Cullen, so the attention of medical men has been seldom fixed on these first principles of the science; and their efforts have been directed chiefly to the elucidation of subordinate departments, capable of more direct practical application, and demanding a more detailed notice.

1. The first of the more special improvements which may be noticed as having been effected within the last forty years is the elucidation of those fundamental questions in Physiology, which bear most directly on Pathology, viz. those which illustrate the causes of *sudden or violent death*; and the more precise information which we now possess on these points may be traced, in a great measure, to the labours of Bichat, who fixed the attention of physiologists on the essential distinction of the Organic and the Animal life of all the more perfect animals, and on the importance of the function of Respiration, as the closest and most permanent bond of union between the two. This intermediate character may likewise be assigned to Digestion, and to all the functions, necessary to the life of animals which are dependent on movements excited, directly or indirectly, by *sensation*, as distinguished from those strictly organic functions in which no mental act is concerned.

The ideas of Bichat of the three modes of sudden death, that beginning at the brain, at the lungs, and at the heart, were in some respects incomplete. He was not aware that by certain kinds of injury of the brain or spinal cord, death may be produced, not through the intervention of failure of respiration, (as in the case of what is strictly called death by *Coma*,) but by a sedative impression suddenly communicated to the heart, and therefore strictly in the way of *Syncope*; he did not seize the right view of the manner in which the circulation is brought to a stand when the access of air to the lungs is in any way obstructed, and was so far inaccurate in his notion of death by *Asphyxia*; he had not studied, at the time of his death, the action of Poisons on the animal economy, so as to be aware of the illustrations of his own principles which these afford; and he had made little application of his views as to violent death to the more complex changes which constitute disease. But these deficiencies have been since supplied. The experiments of Legallois and of Dr. Wilson Philip, and the clinical observations of Brodie, Travers, and others, have sufficiently illustrated the direct effect of violent concussion, or shock, in whatever manner produced, on the heart and other organs of circulation. The dependence of the death by asphyxia, not on the loss of power in the heart, but on the stagnation of blood in the lungs, and failure in the supply of blood to the left side of the heart, has been satisfactorily established by the experiments of Dr. Williams of Liverpool, and Dr. Kay of Manchester. The different modes in which death is produced by Poisons (which are the more important as they are the facts in nature most analogous to the changes which constitute the most deadly diseases) have been clearly pointed out by Sir B. Brodie, and amply illustrated by the researches of Orfila and of Dr. Christison. What is most important in a pathological view is the peculiar depressing influence on the vital actions of the sanguiferous system, which many poisons, belonging to different classes, (e. g. opium and arsenic,) are shewn to exert;—which in the case of some of the mineral and vegetable poisons, as arsenic or tartar emetic in large doses, tobacco, digitalis, hydrocyanic acid, is the immediate cause of death;—and which is the most striking part of the effect produced by animal poisons, such as that of a venomous serpent or the most virulent

contagious effluvia. It may be added that the different modes in which excessive Cold and excessive Heat, and Electricity or lightning produce death, have been sufficiently elucidated by experiments of Chossat, Brodie, and others, and by cases recorded by many practical observers; and that the different effects of violent Hemorrhages have been carefully investigated by Dr. Marshall Hall, Dr. Blundell, and others.

From all these observations it is now fully understood that the ultimate effect of all causes of sudden death may always be referred to their arresting, in ways which we can distinctly specify, the flow of arterial blood throughout the body; which is, in all cases, the essential condition of all its vital actions, although in different tribes of animals, and in different states of the same, the degree of rapidity of the requisite supply of this blood is remarkably various.

It is also distinctly understood that, in all cases of sudden death in the higher animals, most nearly approaching to man, this essential condition fails from one or other of two general causes, either because the vital agency of the powers moving the blood is directly depressed or suspended, or because the action of the air on the blood is obstructed, and the blood therefore stagnates in the lungs;—that the vital action of the sanguiferous system may be suspended in two ways, either by various agents, chiefly acting through the nervous system, which impress it in the manner of a Concussion or Shock, or after the manner of one of the virulent poisons above-mentioned, which act nearly as a concussion does; or by abstraction, sudden or gradual, of the vital stimulus;—and lastly, that the action of the air on the blood may be obstructed also in two ways, either by such injury of the Nervous System as produces insensibility or Coma, and ultimately arrests the mechanical actions of respiration, which depend on sensation; or by direct impediment to the admission of air to the Lungs, arresting the respiration more directly, or producing Asphyxia.

Although it is only in a few cases of disease that life is extinguished in so simple a manner as in any of these instances of violent death, yet it is plain that the scientific treatment of all diseases must be very much guided by a clear perception of the landmarks which are presented to the careful observer, by the study of these simplest cases in pathology.

II. The next important addition to the science of medicine has been furnished by the labours of those physiologists who have done so much, within the last twenty years, to determine the different purposes which are served by the different parts of the Nervous System. The general result of these inquiries may be thus stated: that the very different offices to which the nervous system has long been known to minister, in different parts of the body, are not determined, as was formerly suspected, by the various organization of the parts, but by the various endowments of different portions of the nervous matter itself, in relation to those mental acts of which they are the seat and the instrument.

The dissections, experiments, and clinical observations of Sir Charles Bell, Mr. Shaw, and Mr. Mayo, in this country, of Magendie, Serres, Des Moulins, and Flourens in France, and of Rolando and Bellingeri in Italy, are the most important of those by which it has been ascertained, that the conditions which are necessary to all the sensations, and to the excitement of all muscular motions by mental acts, are confined to those nerves, and to those portions of the spinal cord, and its immediate prolongations within the cranium, to which we now give, without difficulty, the names of sensitive and motor respectively. We can specify those portions of this Cerebro-Spinal Axis, on which each of the sensations peculiarly depends; we can point out the use of parts within the cranium, in immediate connexion with the Cerebro-Spinal Axis, by which voluntary or instinctive motion in different directions is determined; we can form some idea of the parts of the nervous system, and of the peculiarities of structure, by which the influence of mental acts over the involuntary motions, and other organic functions, is maintained; and we can shew that the brain and cerebellum are not essential to the performance of the functions of the spinal cord and nerves; that they are neither required for sensation, nor for those instinctive actions which are most intimately linked with sensations, but are superimposed on those organs with the intention of combining sensation and instinctive action with the higher attributes of mind. These parts of the nervous system furnish the conditions, not of sense or motion, but of intellect, of desires, and moral feelings; they are required, not in

order that sensations may be felt, but that they may be remembered, and availed of for useful purposes,—not in order that volitions may act as stimuli on muscles, but that they may be so excited, and so succeed one another, as to produce regular and useful voluntary actions, under the guidance of desires, and of judgement and experience, as distinguished from blind instinct.

So far the different endowments of the different parts of the nervous system may be held to have been determined by observation and experiment; and if we decline to enter farther into the speculations of phrenologists (which have attracted so much attention of late years), as to the connexion of the individual parts of the brain with the different intellectual powers, or with the exercise of these powers on particular objects of thought, it is not because we regard the general principle of those speculations as unphilosophical, but simply because they are founded on a kind of observations which is open to various sources of fallacy, and derive little or no support either from experiments on animals or pathological observations on the human body, and appear, therefore, to be built on insufficient evidence.

The knowledge of the endowments of the different parts of the nervous system, so far as it has been hitherto attained, is a great and important step in physiology; it is of importance in the diagnosis of many of the diseases in which the nervous system is concerned, as fixing the precise seat of these diseases; and it enables us to explain the great diversity of symptoms, which may result, in different cases, from apparently similar lesions of the brain and cerebellum, and so to surmount what was formerly a serious difficulty in pathology;* but it is susceptible only of occasional and partial application in the practice of medicine, simply on this account,—that practical questions as to the treatment of diseases, especially of different diseases of the same texture, must always turn much more on their nature than on their seat.

III. Many other improvements in Physiology have been effected since the close of the last century, on which it were out of place to dwell here, because they are hitherto susceptible of still more partial application either in pathology or practice; but which must not be omitted in any general account of the progress of medical science. The chemical analysis of the Blood has been carried to a high point of perfection; and the varieties in the proportion of its constituents in different circumstances, the essential differences of venous and arterial blood, the essential nature of the process of coagulation, and the circumstances by which it may be accelerated, retarded, or prevented; the alterations effected by inflammation in the proportion of the fibrine, and in the property of coagulation; the organization of the fibrine which exudes from inflamed surfaces; and the proofs, resulting from these last facts, of the existence of strictly vital properties in the blood as well as in the solids of the body, are all points that have been elucidated by numerous experimental inquirers, following the path which had been opened by Hunter and Hewson; and among these Bostock, Berzelius, Marcell, Hey, Thackrah, Davy, Prevost and Dumas, Le Canu, Denis, Gendrin, Schiroeder Van der Kolk, Babington, and Prater, may be particularly mentioned.

The nature of muscular contraction in general has been more fully investigated by Prevost and Dumas than by any previous physiologists; and the question, repeatedly agitated, whether there be any change of volume in the fibres at the time of their contraction, has been resolved in the negative by these authors, by Mayo, and others. The vital actions of the heart have been particularly studied, and the use of its valves, and of the peculiar convoluted structure of its muscular fibres, if not fully ascertained, have been much elucidated by the dissections and experiments of Gerdy, of the late Dr. Duncan, of Williams of Liverpool, Corrigan, Hope, Carlile, &c., as well as by

* It is due to the memory of the late Dr. Gordon of Edinburgh to state, that as early as 1813 he had inferred, from pathological facts already known, that the brain and cerebellum are not concerned in sensation nor in certain voluntary actions. He thought that palsy, in any of its forms, when produced by disease within the cranium, higher than the medulla oblongata, might be referable, not to loss of the essential conditions of sense or of voluntary power, but to what he called a "noxious influence," transmitted in some such cases, and not in others, from the seat of the disease to the nerves of the parts affected. Of the share which the medulla oblongata and spinal cord may have in these functions he spoke doubtfully, as the state of our information at that time required. The facts which he had collected on this subject are contained in a paper in the twenty-fourth volume of the Edinburgh Review.

the clinical observations of Laennec, and the correction of some of his conclusions by Professor Turner and others. The nature of the vital power which can be ascertained to exist in arteries has been satisfactorily determined by the experiments of Parry, of Wedemeyer, and of Poiseuille. The auxiliary forces which contribute to the flow of blood along the veins, and particularly the effect produced on its movement there by acts of inspiration and expiration, have been partially indicated by Carson, and more clearly pointed out by Magendie and Sir D. Barry. And the flow of blood in the capillary vessels, under various circumstances, has been carefully examined, and subjected to comparison with the movement of fluids in the lower classes of animals and in vegetables, by numerous observers, of whom the most deserving of notice are Thomson, Hastings, Black, and Marshall Hall in this country; Du Trochet, Leuret, and Gendrin in France; and Schultze, Dollinger, and Kaltenbrunner in Germany.

On the whole, it may be stated that the investigation of the powers by which columns of blood are moved through the larger vessels of the human body, seems to be nearly complete; but farther inquiries are still demanded, to determine the nature and estimate the efficacy of the powers, by which the movement of the blood is affected and its distribution regulated, after it has been diffused throughout the innumerable ramifications of the capillaries; and this deficiency is the more important, as it is clearly in the alteration of vital actions of which the capillaries are the seat, that all the most formidable diseases originate. The principle of Endosmose and Exosmose, illustrated by the experiments of Du Trochet and others, certainly does not develop the sole agent of vital movement in the capillaries; but it exhibits movements, even in inanimate fluids, which may be said to bear the same relation to the chemical actions of these fluids on one another, as certain of the movements of living fluids bear to the vital changes to which they are destined.

In regard to the functions of Nutrition, Secretion, and Excretion, to which the circulation is subservient, perhaps the most important information, lately obtained, is of a negative character. Notwithstanding the opposite opinion of some eminent physiologists, it may be stated as the general belief, and as a fair inference from a review of the different departments of living beings, as well as from experiments and observations on the higher animals, that these processes are independent of any influence or energy necessarily derived from the nervous system.*

It may also be laid down as a principle established, chiefly by the observations of Cuvier, that the differences among the products formed from the blood in the living body, great and numerous as they are, cannot be explained by the differences of organization, or by any peculiarities of the vascular arrangements, of the parts where they shew themselves.

Several circumstances, in regard to the intimate structure of organized substances, both animal and vegetable, have lately attracted much and deserved attention, as clearly distinguishing them from any products of the chemical attractions which subsist among the particles of dead matter. The most important are, the very general tendency of substances which are the result of vital action, to take the form of globules, or rather of cells, in which a containing cyst and a contained matter are usually discernible; the total absence of crystalline arrangement in the living and growing parts of these textures; and the fact, that the particles of earthy and saline matters which enter into the composition of organized substances, however small their proportion to the whole, are never aggregated together, but are equally diffused through the whole mass, and retain the original form and dimensions, even after the whole of the strictly animal or vegetable matter has been burnt out. These facts, established by Dr. Prout in this country, and by Milne Edwards, Tiedemann, Raspail, and others abroad, clearly indicate that the attractions and repulsions which subsist among the elements constituting organized bodies, at the period of their formation by living

* It is perfectly in conformity with this doctrine to state, that the nutrition of certain parts, as of voluntary muscles and the organs of sense, and that the secretions of other parts, especially of mucous membranes, are *habitually excited* by voluntary motions and by sensations, and therefore become deficient when certain nerves, of voluntary motion or of sensation, are injured or palsied. This principle seems to furnish the true key to the facts observed in numerous recent experiments on animals, by Brodie, Wilson Philip, Swan, Breschet, Leuret and Lassaigne, Magendie, and others, as to perversion of secretion and nutrition from section, particularly of the fifth and the eighth nerves. And the same principle may be applied to various important phenomena in disease.

action, are essentially different from those by which the same elements are actuated in other circumstances; and establish the existence of a distinct set of laws, regulating their combinations in living structures, to which the general title of *Vital Affinities* has been happily applied.

As the analysis of the blood has been improved, so many of the proximate principles which go to the composition of animal substances have been detected in it, or procured from it by very simple means, that the processes by which the solids of the living body are nourished, or the prepared fluids furnished, have been gradually more and more regarded as nearly approaching to simple transudation, or, as it has been appropriately termed, Chemical Filtration. And since the process of assimilation or sanguification, by which foreign matters are added to the blood, either in the adult or foetal state, has been minutely traced, so much contrivance for the gradual formation of the blood has been developed, that we are the less surprised to find so many proofs of its very heterogeneous nature when it comes to the extremities of the arteries, and is applied to the purposes of nutrition and secretion; and of the apparent simplicity of these processes themselves.

One principle, at least, may be held to be nearly established on this subject, that the materials of the different *Excretions* already exist in the compound blood, and are only evolved or separated, not formed from the blood, at those organs at which they respectively appear. This is certain as to the urine, from the result of the experiments of Prevost and Dumas, and of pathological observations by Dr. Christison and Dr. Bostock in the human body, from which it appears that when the kidneys are extirpated or more gradually obstructed, and rendered unfit for their office, the urea, or peculiar matter of the urine, shews itself in the blood. As the peculiar matter of bile appears now to have been detected, even in healthy blood, and as there are undoubtedly cases of intense jaundice, in which the bile-ducts appear on dissection pervious and *empty*, even throughout the substance of the liver,—where there is therefore no reason to suppose that any secretion of bile had taken place,—we have good grounds for extending the same conclusion to the liver, as we have stated in regard to the kidneys. And there is still less difficulty in extending it to the excretions by the skin and the lungs. We may consider the function of excretion, therefore, (which is a concomitant of vital action in all living beings without exception,) as having its origin in all parts of living bodies, or more probably in the *nourishing fluid* which penetrates and vivifies them all; and as the necessary complement of the process of assimilation, by which extraneous substances are incorporated with organized matter.

The important discoveries as to the nature of the corresponding process of Absorption, which have been made of late years by Magendie, Segalas, Foderé, Meyer, Tiedemann, Barry, and many others, (when duly compared with the comments of other physiologists,) may be thus expressed,—That although the set of vessels described for a century past by the name of absorbents are really destined to the office of absorption, and their structure, in various ways, is peculiarly adapted to it, yet it is not through them, nor through any one set of vessels exclusively, that the absorption of extra-vascular substances into the circulating mass is effected; that a function precisely similar is executed in many living beings, without any set of vessels being appropriated to it; and that the absorption of extra-vascular matters in the higher animals must be ascribed, therefore, in the last result, to peculiar relations subsisting, in the living state, between those matters and the circulating blood, rather than to the peculiar nature or forms of the vessels which are the organs of absorption; and, accordingly, that the degree of absorption is very much influenced by two circumstances in the condition of the circulation at the part where any such extraneous matters may lie,—viz. by the fulness of the vessels, and by the rapidity of the current at that part; being always diminished when the vessels are much distended, and likewise when the flow along these vessels is much retarded or suspended, as by the removal of atmospheric pressure from any portion of the surface of the body.

Another principle in regard to absorption in the more perfect animals, of complex structure, which recent inquiries have illustrated, and which has been already briefly noticed, is probably of fundamental importance, viz. the careful provision which nature has made for the very gradual intermixture of any foreign matter, thus introduced, with the nourishing fluid of the body receiving it. Thus, when extraneous matter is received into the *principiae viæ*, it is not only acted on by the fluids there provided for

its reception, and part of it rejected, but the absorption of what is capable of assimilation is divided between two sets of vessels; what is taken up by the veins is carried to the liver, and certain combinations of the elements contained in it are there expelled;—what is taken up by the lacteals is mixed with certain elements of the blood in the absorbent vessels, and particularly in the mesenteric glands; and both portions are carried through the capillaries of the lungs,—where certain matters are evolved from them, and at least one important element added to them,—and are subjected to thorough agitation and intermixture on both sides of the heart, before they are admitted into the arteries, in a condition fit for the purpose of nutrition.

That these arrangements, and others which have a similar effect in the lower animals, are intended to secure the very gradual intermixture and incorporation of fresh nourishment with the blood, we shall be prepared to admit when we remember, that throughout all the classes of organized beings, and in all periods of their independent existence, the assimilation of the crude nourishment, taken in from the external world, is always effected by means of organized matter already existing in each living structure itself; and farther, that in the case of animals at least, the greater part of the ingesta, which are subservient to nutrition, are themselves organized substances, the products of vital action in some of the lower orders of living beings, and the assimilation of which may therefore be said to have commenced in these lower orders of the animated creation. From such facts it is obvious that there must be contrivances, in all living beings, for the fulfilment of those still mysterious laws and conditions, by which the chemical changes effected by them on the surrounding elements are regulated and controlled; and among these contrivances, the arrangements of the different absorbent vessels and of the excreting organs must evidently be ranked.

The chemical nature of the changes which take place in the air, and in the blood, or nourishing fluid of all living structures, in Respiration, has been often and carefully investigated since the time of Black, Priestley, and Lavoisier, especially by Ellis, by Allen and Pepys, and more lately by Edwards, Du Long, and Collard de Martigny. The general result is, that the absorption of oxygen and the evolution of water and carbonic acid are the essential changes; but that the products thus evolved are the result, not of a simply chemical action at the lungs or corresponding organs themselves, but of the vital actions throughout the system, by which the blood acquires the venous character before it reaches the lungs. The adaptation of arterial blood to the maintenance of vital action in general, and of circulation in particular, seems to be one of the primary laws or conditions of vitality, for which it is in vain to look for an explanation, and the mode of operation of which is illustrated by what has been already said of the nature of death by asphyxia.

The questions, whether the maintenance of the Heat of living animals is satisfactorily explained by the strictly chemical changes that take place in the body, and especially at the lungs, and how far it is dependent on any action of nerves, have been prosecuted with great zeal, since the time of Black, Crawford, and Lavoisier, by Sir B. Brodie, Dr. Davy, Legallois, Hales, Drs. Wilson Philip and Hastings, Chossat, Edwards, Du Long and Despretz, and others. The general conclusion is in favour of the sufficiency of the chemical changes to explain it, and of the influence of that particular change, on which the evolution of carbonic acid depends, in elevating the temperature of animals; and there is, perhaps, no case in physiology to which the maxim, "Frustra fit per plura quod potest fieri per pauciora," is more fairly applicable: but two points have been likewise ascertained, which were not in the view of the first speculators on this subject, viz. 1. That the chemical changes on which the temperature of the living body depends, cannot be confined to the lungs, nor to the formation of carbonic acid in the body; and, 2. That these changes are remarkably liable to influence from causes, and especially from injuries, affecting the nervous system.

The power which living animals possess of maintaining a temperature lower than that of the surrounding air, has been shewn by De la Roche and Berger, and by Edwards, to depend merely on the increased evaporation from them, and therefore on a simply chemical principle.

In regard to the function of Digestion the most important additions to our knowledge have been made by Drs. Maracet, Prout, Wilson Philip, and Sir B. Brodie, in this country, by Tiedemann and Gmelin in Germany, and by Magendie, Londe, and Leuret and Lassaigne

in France ; and of these the following chiefly demand attention :—1. The division of alimentary matters into the great families of albuminous, saccharine, and oily ; and the necessity of mixture of at least two of them for the nourishment of man and of the most analogous animals,—(another fact which shews how much hitherto unexplained contrivance must be included under the term Assimilation of food.) 2. The secretion of an acid solvent liquor, containing the muriatic acid, in the stomach, subsequent to the reception of aliment, and regulated to a certain degree in its quantity and strength by the nature of the aliment received. 3. The great diminution of this secretion, usually caused by section of the par vagum, particularly in the neck, in circumstances when we know that the sensations of the stomach and of the lungs are very much perverted. 4. The appearance of matter possessing in some degree the characters of albumen, in the chyme thus formed, even in the stomach, and the increasing proportion of this matter in the upper part of the bowels, and in the contents of the lacteals and thoracic duct. 5. The formation of globules, similar to those of the blood, in this albuminous matter, likewise commencing in the stomach. 6. The gradual combination of the acid and oil of the chyme, with the alkali of the bile, in the course of the small intestines, and the gradually increasing proportion of the peculiar animal and excretory matter of the bile, in tracing the contents of the intestines downwards, as the acid and the albuminous matters disappear. 7. The albuminous and slightly acid nature of the pancreatic juice, its greater abundance in herbivorous animals, and the corresponding fact, that in the human body vegetable food is chiefly acted on after it has passed the pylorus. 8. The reappearance of acidity at the cæcum, and probable renewal of a certain degree of the digestive process in the great intestines.

Besides the great discovery of the various endowments of different parts of the nervous system, some farther improvements have been effected in that part of physiology which treats of the strictly animal functions—Sensation, Thought, and Voluntary motion. Various facts as to the conditions requisite for the exercise of the senses, and particularly of the sense of sight, have been ascertained ; and the general views of physiologists as to the information which the senses convey, and the mental processes which they excite, have become, at least in this country, more scientific and precise.

Perhaps the most important proposition which can be stated in this part of the subject, is one which has been best illustrated by Dr. Reid and the other Scotch metaphysicians,—that many of the mental acts, which are naturally and uniformly excited by the exercise of the senses, bear no resemblance whatever to the sensations from which they originate ; that not only the general ideas which arise in the mind in consequence of impressions from without, (such as time, space, number, power, &c.) are wholly unlike anything which was ever presented to our senses, but the notions which we form of the qualities of the objects of sense themselves, (such as hardness, softness, extension, motion, &c.) bear no resemblance to the sensations which lead us to form them. Our ideas, therefore, are not, as some philosophers have supposed, merely “transformed sensations ;” nor does the external world itself appear to us as the “express image of our sensations ;” and the true source of much of our knowledge is, not in the mere intimations of sense, but in the *judgments* which by the constitution of our nature *we intuitively form*, in consequence of receiving these intimations.*

When this principle of Intuition, which must necessarily be admitted as one source of the information acquired through the senses, is duly considered, it will appear that we have no means *a priori* of judging what is the kind and extent of information, as to the qualities of external things, which any sense may be capable of communicating, to man or to other animals ; and it is still doubtful, whether or not many reported cases of alleged transference of the higher or peculiar senses from one part of the system to another, are referable only to this general principle.

At all events, it is obvious that as we necessarily include under the term Mental Acts many phenomena which are neither included in sense, nor logically deducible from the intimations of sense, the study of these mental acts, as we feel them in ourselves, and as we judge from their results that they are felt by others, (a study which on many accounts demands the attention of the physician,) must be prosecuted quite

* See Stewart's Philosophical Essays, “On Mr. Locke's Account of the Origin of our Knowledge.”

separately from that either of the sensations or motions of any living beings; and provided that the attention be fixed on matters of fact, and all useless controversies be avoided, this study may be prosecuted with more advantage in the writings of metaphysicians than of mere physiologists. In this view the treatises of Dr. Abercrombie, on the Intellectual and Moral Powers, are peculiarly valuable; and perhaps, the view there given of our mental constitution may admit, for the sake of the medical student, of still further abridgement.

Lastly, in enumerating the additions which physiology has received since the end of last century, we must not omit the numerous observations which have been made on the necessary conditions of the function of Generation, and on the mode of life and development of the foetus. These observations have been made chiefly on different classes of the lower animals; and the varieties of this function in the different classes, and the conclusions to be drawn from the study of these, in fixing the essential conditions of the function, have been admirably stated by Cuvier.

The ovum of some of the mammalia has been detected, first by Bär, in the Graafian vesicle of the ovary; the nature of the changes, at the ovary, which precede and follow the escape of the ovum, and the fallacies attending the appearance of the corpus luteum, have been elucidated (perhaps not yet completely determined) by Sir Everard Home, Magendie, and others; the existence of animalculæ in the prolific male semen has been confirmed by Magendie, and Prevost and Dumas; the necessity of the actual contact of the male semen with the ovum that descends from the ovary, has been put almost beyond dispute by the experiments of Drs. Haughton and Blundell; while the ascent of the seminal fluid in ordinary circumstances to the ovaria themselves has been disproved, both by their experiments and by the observations of Prevost and Dumas.

The changes produced in the uterus by conception, the nature of the connexion between the ovum and uterus, and the manner in which the ovum is nourished both before and after the formation of the placenta, have been subjected to new and careful examination, chiefly by Breschet and Velpau in France, and Dr. Lee in this country. In reference to the general principles of physiology, the most important proposition that has been stated on this subject is that which appears to be nearly established by this last author,—that there is not only no vascular connexion between the mother and the foetus, but none, or next to none, between the uterine vessels and the placenta; and, therefore, that there is no force, acting in the way of *propulsion*, which will explain the application of portions of the maternal blood to the nourishment of the foetus; while at the same time the experiments of Magendie and others have proved, that any substance which may be circulating in the blood of the mother finds ready access to that of the foetus, but that there is little or no transference of fluids in the opposite direction.

The numerous and careful observations which have been made on the development of the fetus in its earlier stages, in different classes of animals, by Pander, Wolff, Rathke, Bär, Prevost and Dumas, and other, chiefly German physiologists, have sufficiently established, although in opposition to the opinion of Haller, the general doctrine of the Epigenesis, or growth by the *formation* of parts out of the fluids of the ovum, as opposed to that of the Evolution, or growth by the *extension* of parts; and the gradual development of the different organs and textures, the bones, the vascular system, the nervous system, &c., have been minutely traced by Soemmering, Meckel, Tiedemann, Serres, Allen Thomson, and many others. The peculiarities of the blood of the foetus have also been examined; and the curious discoveries of Sir Astley Cooper and Dr. Lee, of the formation of albuminous matter in the thymus gland, and in the liver, of the foetus, have distinctly shewn that here, as well as in the adult, there are contrivances adapted to the general object of Assimilation, the particular intention of which is still mysterious.

The knowledge of the essential nature of the changes, occurring at birth, by which life, previously maintained by organic functions only, is placed in dependence on the sensations of the new being, and so rendered truly animal and independent of the mother, is necessarily dependent on that correct exposition of the essential conditions of life in the adult, to which we have already adverted. The changes in the state of the circulating system, and of the lungs, consequent on birth, have been examined and accurately described by Chaussier and various other authors, particularly with a view to important questions in medical jurisprudence. And those peculiarities of the vitality of the very young

warm-blooded animal, in which it approaches to that of the cold-blooded, especially its power of resisting the privation of the natural stimuli of heat and oxygen, have been particularly remarked by Edwards.

Various facts, of great importance as illustrating both the influence of hereditary constitution and of the habits of parents, and also that of climate, air, exercise, diet, and mode of life, on the growth, the healthy functions, and the diseases of the human body, have been ascertained and recorded by different practical authors; the distinctions of the different races of men now inhabiting the earth have been carefully observed by Blumenbach, Lawrence, Prichard, Des Moulins, Mayo, and others; and the peculiarities of some of these races as to liability to, or exemption from, different kinds of disease have been to a certain degree investigated by various authors, since the time of Rush, in America, and by Drs. Ferguson, Johnson, Marshall, and others, who have had opportunities, in the British service, of making such inquiries in different regions of the globe.

In the present state of Physiology, perhaps the most important inference that can be drawn from this hasty survey of the recent additions to the science is that of the extent which must be given to the idea of Vital Action, beyond what can be included in, or explained by, the Vital Motions of living solids. It is true, indeed, as stated by Cullen, that the "primary moving powers of the animal economy" (by which he understood the vital powers of the moving *solids*) must be more or less concerned in all the changes which take place in the healthy body, and in all the deviations from these which constitute disease; but they are only a part, and frequently not the most fundamental part, of these changes. It is probable that there may be movements in the nervous system, corresponding to all the changes, mental or bodily, which are connected by nature with its living condition; but they are movements which elude our senses; and we must be content to know the changes that take place in the nervous system itself, only by their effects on the mind on one hand, or on the body on the other. As to the changes in the *fluids* of the body which are essential to the life of the solids, it seems certain that even the motions of the fluids in the capillaries, and still more that the peculiar chemical actions to which they are there subservient, cannot be explained either by the ordinary laws of chemistry, or by any modifications of the impulse communicated to them from the solids; and, therefore, that there must be certain Vital Affinities, and Vital Attractions and Repulsions, in which the fluids as well as solids must participate, and on which all vital phenomena are essentially dependent.

When Mr. Knight stated, as the result of a laborious inquiry in vegetable physiology, that the vital power of generating new wood does not reside either in the outer layer of the albumen or in the inner layer of the bark, but "*in a fluid which pervades the vessels of both*," he stated a principle which is equally applicable to the whole economy of animals; and under which must necessarily be included the most important of those Laws of Vital Action, which it still remains for physiologists to develope. And as we must take the fluids, and the changes proper to the fluids, into account in all attempts at explanation of physiological phenomena, so we must be prepared to admit a Humoral Pathology as essential to the explanation of all the more important phenomena of disease; but this must be a pathology founded on observed changes, not simply of the mechanical or chemical condition, but of the strictly *vital properties* of the fluids, and especially of the blood.

CHAP. II.

Recent additions to our knowledge of the external causes of diseases—Of those which operate generally, and of those which are of local and temporary operation only—Additions to our knowledge of the nature and treatment of acute diseases—Of inflammatory diseases—of their consequences, and varieties—Of idiopathic fever—Its essential distinctions from, inflammation—Its varieties and complications—Of other epidemic diseases—Their different modes of fatal termination, and the adaptation of remedies to them.

Next to the additions which have been made since the end of the last century to our knowledge of physiology, we may place the numerous important observations by which our information as to the *external causes* of disease has been rendered more extensive and more precise. These observations, and the inferences from them, demand the more attention from physicians, that they necessarily involve a kind of evidence

essentially different from that on which we proceed in other medical inquiries. And if we durst hope that the progress of human wisdom and virtue would bear any proportion to that of human knowledge, we might expect that the lessons to be drawn from these inquiries would prove of even greater importance to the future happiness of mankind than any which we can gather from the history or treatment of diseases.

These inquiries have in some instances been prosecuted by individuals in civil life; but the opportunities of making decisive observations on some of the causes of disease which occur in the experience of medical officers of fleets and armies,—who are perfectly informed of the whole circumstances of the organized bodies of men under their observation, and often see these circumstances suddenly altered, or have even the power of altering them at pleasure,—are much superior to those which other practitioners enjoy; and the peculiar value of such observations has never been so well understood as during the last war.

In stating the general result of recent observations on the causes of diseases, it is well to keep in view, *first*, the old and well-known distinction of predisponent and exciting causes, and, *secondly*, the division of the latter class of causes into those which result from the very conditions of our existence, and therefore operate generally among our species, and those which are of local and temporary existence only, and are commonly known by the name of morbid poisons.

In regard to the predisposition to disease, many important facts were well known to the pathologists of the last age; but as to one, and that probably the most important of all the circumstances of predisposition, our information has lately been much extended. This is the great predisposition, given to acute diseases especially, by the previous influence of causes of Debility, which may usually be referred either to deficiency of the natural excitements of the human system, therefore to imperfect nourishment, or defective nourishment from previous diseases, impure air, deficient exercise, long-continued heat, long-continued cold, or permanent mental depression; or else to excessive and exhausting excitement, therefore to fatigue, watching, or intemperance of all kinds.

The great amount of disease and mortality, which may be traced to the operation of these debilitating causes, applied long previously to the commencement of any diseased action, has been illustrated by statistical inquiries into the health and probability of life of different classes of the community, and of the inhabitants of towns as compared with those of country districts; and among the authors of such inquiries, Drs. Perceval (of Manchester), Bisset Hawkins, Clark, and M. Villermé, deserve particular notice. The influence of some of the individual causes now mentioned has been more specifically demonstrated by the experience of military and naval medical officers; among whom we may particularly mention Sir Gilbert Blane, Sir James Macgrigor, Dr. Trotter, Dr. Johnson, Dr. Robertson, and Dr. Luscombe.

Of those exciting causes of disease which are of pretty uniform operation, the application of Cold is that which it is most important to understand; and on this subject our knowledge has been rendered much more satisfactory and precise by the observations of Dr. Currie, and by the practitioners who followed his directions as to the use of cold in febrile diseases. From those observations it may be stated, as a general result, that the morbid effects of cold depend, not simply on the temperature applied, nor on the suddenness of the application, nor on the previous heat of the body; but on the intensity and duration of the sensation which is produced by its application, and especially on the circumstance which primarily determines the duration of that sensation, viz. the facility with which, from the previous state of the system, the circulation on the surface of the body is checked and depressed.

In regard to the Morbid Poisons, which excite diseases often of the most virulent and appalling character, but confined to certain seasons or localities, there has been much and often violent discussion within the last forty years; during which time the contagious nature of the fever of this climate, of yellow fever, of plague, of purulent ophthalmia, of erysipelas, dysentery, and malignant cholera has been successively and freely agitated; the laws of the origin and diffusion of the malaria producing intermittent and remittent fevers have been investigated; and the extraordinary protection against small-pox afforded by vaccination has been first established as a general law by the observations of Jenner, confirmed by others in all parts of the world, and afterwards ascertained to be subject to limitations, the exact amount of which is still doubtful.

Perhaps the most important results of the labours bestowed on these important subjects are the following:—

1. The contagious nature of the common continued fever of this country has been firmly established; at the same time the truth of the representations of the older authors, as to the variations to which this disease is liable at different times and places, in duration, in symptoms, in the effects of different remedies upon it, and the extent to which these can be borne, and in the degree of its contagious property, has been fully and repeatedly demonstrated.

2. The influence of the most important auxiliary causes which favour the extension of this disease,—the cold weather of this climate, imperfect nourishment, and mental depression,—has been fully exemplified and repeatedly observed, particularly in the disastrous history of various military enterprises, and in the equally melancholy civil history of one unfortunate portion of the British dominions: * whether these circumstances of predisposition ever suffice for the generation of the disease, without the aid of a specific contagion, is perhaps still doubtful.

3. It has been well ascertained, particularly by the researches of Dr. Bancroft, that neither the accumulation of human effluvia from healthy persons, nor the effluvia from putrid animal and vegetable matters, (however injurious to the strength, and in various ways to the health, of the human body,) are a sufficient cause for the production of contagious fever.

4. Several of the conditions which appear chiefly to favour the development and propagation of the malaria, which is the other great cause of fever, have been sufficiently investigated, perhaps more successfully by Dr. Fergusson † than any other author. It appears certain that the stagnation, and subsequent evaporation, of water on the earth's surface are essential to the development of this poison, and that the higher the temperature at which this evaporation takes place, the more violent is the poison generated. It is very doubtful whether any putrescent matter is necessarily connected with its formation; but it must be admitted that there is some condition necessary to that process, which is still unknown, and that we must still be guided in a great measure by experience in judging of the situations where it is chiefly to be apprehended.

5. It has been clearly ascertained that the contagious fever of this climate, which usually abates during the summer, is seldom or never met with in the tropical climates; and this fact seems to be illustrated by the important observations of Dr. Henry, by which it appears that the contagious effluvia of the exanthemata, as well as of typhus, loses all efficacy at the temperature of 140° or even 120°. On the other hand, it is certain, that the fever from malaria is greatly aggravated in these climates, and takes, occasionally, quite the form of the most malignant Yellow Fever. It has been ascertained, also, that the worst epidemics of that kind, which have so frequently appeared in certain localities in the hot climates, are generally to be ascribed to certain local causes, and are confined within certain limits or boundaries; so that among those who keep beyond these limits the disease hardly ever spreads, whatever the intercourse of persons already affected with others may be; as has been repeatedly exemplified at Gibraltar, New York, &c.; but it is still doubtful whether, within these limits, and at these times, the worst form of the yellow fever does not spread by contagion.

6. It has been equally demonstrated that the Plague spreads by contagion chiefly, if not exclusively, although with very various rapidity on different occasions; and that precautions to prevent the intercourse of the sick with the healthy are more certainly efficacious in checking the ravages of that than any other epidemic disease; as has been repeatedly found in the experience of the British colonies in the Mediterranean, as well as of the army in Egypt.

7. It has been shewn, to the satisfaction of the greater number of medical men who have seen the diseases prevailing epidemically, particularly in civil life, that the purulent ophthalmia is a contagious disorder; and that erysipelas and dysentery do also occasionally spread by contagion; but it has also distinctly appeared that completely

* It is gratifying to be able to state that the members of the *medical* profession in Ireland cannot be charged either with want of zeal to alleviate the distresses of their countrymen, or with want of judgment and intelligence in attempting to draw, from these distresses themselves, lessons of the highest importance to posterity.

† *Edinb. Philosophical Transactions*, vol. ix.

isolated cases of the two last diseases occur so much more frequently in some seasons and countries than in others, that there must be some cause, not yet understood, corresponding to the idea usually affixed to the term "epidemic or atmospheric influence," which aids in determining many attacks of these diseases.

8. The numberless observations which have been made, in so many different quarters of the globe, on the diffusion of the malignant Cholera, have still left such an obscurity on that point as clearly to indicate that the mode of extension of that "nova pestis" must be very peculiar. The present writer has no difficulty in expressing his own conviction that the disease has a contagious property; which conviction is founded simply on the repeated observation of persons who had intercourse with those ill of the disease, becoming themselves affected in a proportion infinitely greater than those, similarly circumstanced in other respects, who avoided such intercourse. But, on the other hand, it is equally certain that in various instances, where it has prevailed epidemically, this superior liability of those holding intercourse with the sick has not been observed; it has affected so many, in whom no such intercourse could be ascertained, or appeared possible, and has left unaffected so many others, whose intercourse with the sick had been frequent and close,—that we can hardly suppose contagion the only mode in which it can diffuse itself.

It may be added, that whatever be the true origin of the poison which generates the cholera, it certainly possesses in an extraordinary degree the properties, which all other morbid poisons possess in some degree, of lying latent for a length of time,—in certain localities, or in the constitutions of individuals, or in both,—and afterwards resuming its activity and rapidly extending itself, without any assignable cause.

The additions which have been made to our knowledge of the Nature and proper Treatment of diseases during the time under review, may be traced, for the most part, to the extent and minuteness with which the study of Morbid Anatomy has been cultivated. The example of Baillie in London; the lectures of the late Dr. Gregory in Edinburgh, (who, although not deeply learned in morbid anatomy, was keenly interested in the subject, and took every opportunity of inculcating its importance;) the laborious researches of Abercrombie and others, have had much influence in extending this study among British practitioners; but we must admit that it is to the zeal of the profession in France, and to the opportunities afforded by the French hospitals, that we are chiefly indebted for the increased extent and precision of our knowledge of the changes of structure effected in the human body by disease.

This study has, indeed, engaged so much attention of late years, that the term Pathology has very often been used as synonymous with morbid anatomy; as if there were no other sources, from which we could draw our knowledge of the changes in the living body, constituting disease, than the changes in the dead body which disease leaves behind it. This, however, is a manifest error in science. These alterations in structure produced by disease are only one of the elements of our reasoning on the nature of diseased actions themselves; and there are many other facts, as to the external causes of diseases, the nature of their leading symptoms, their consequences, local and general, in the living body, and the *juvantia* and *laedentia* affecting them, which likewise furnish the proper elements of inductive reasoning, for the determination of those laws of the animal economy, which it is the object of the science of pathology to establish.

It is also an important practical error to fix the attention, particularly of students of the profession, too much on those characters of disease which are drawn from changes of structure *already effected*, and to trust too exclusively to these as the diagnostics of different diseases; because in many instances these characters are not clearly perceptible until the latest and least remediable stage of diseases; the very object of the most important practice in many cases is to *prevent* the occurrence of the changes on which they depend; and after they are established, the cases are very often hopeless, or admit only of palliative treatment. In those diseases in which most can be done by art, our practice must always be guided in part by conjecture, because, if we wait for certainty, we very often wait until the time for successful practice is past; and therefore, although an accurate knowledge of the whole history of each disease is essential to its proper treatment, yet in a practical view the most important part of its history is the assemblage of symptoms, by which its nature at least, if not its precise seat, may often be known, before any decided lesion of

structure has occurred. Accordingly, when this department of pathology is too exclusively cultivated, the attention of students is often found to be fixed on the lesions to be expected after death, much more than on the power and application of remedies, either to control the diseased actions, or relieve the symptoms, during life.

But although in this as in other instances, there has been an admixture of error, if not in our scientific acquisitions themselves, at least in our estimate of their value, and our judgment of the uses to which they may be applied, yet it is evident that the department of Morbid Anatomy is that in which the grand improvement of medical science has lately been effected; and that it is from judicious reasoning on the more intimate knowledge thus acquired of the nature of diseases, that any material improvement in the precision of our practical rules has resulted.

These observations apply particularly to the case of inflammatory diseases, those in which remedies avail the most, and with the history of which, therefore, it is most important to be familiar.

The characteristic effects of Inflammation, adhesion, suppuration, ulceration, and gangrene, have been investigated with great acuteness and success by Mr. Hunter and his followers, among whom Dr. Thomson, of Edinburgh, may be particularly noticed; and the provisions of nature for the favorable terminations of all these processes are now well understood. The nature of the process of inflammation itself has been carefully scrutinized, in so far as microscopical observations avail in the research, by Drs. Wilson Philip, Thomson, Hastings, and Black; and more lately by Andral, Gendrin, Kaltenbrunner, and others. It may be confidently asserted that these observations have proved the inadequacy of any explanation of the process, which turns merely on the changes in the contractile power of the vessels concerned. It was, indeed, clearly perceived by Mr. Hunter, that changes in the vital properties of the blood itself must necessarily be taken into account, in attempting any explanation of inflammation and its consequences; and the inquiries of the three last-mentioned continental authors, of Schreder, Van der Kolk, Pring, Rogerson, and others, have opened a prospect of some more definite information being acquired as to the nature of the essential changes which these vital properties undergo during these processes.

But the most important recent additions to our knowledge of inflammatory diseases have been the accurate observations made on the Varieties of Inflammation, and consequently increased precision of our views as to the different *modes of fatal termination* to be apprehended in different inflammatory diseases; and these may be considered under several distinct heads.

1. Much has been done in regard to the different course and effects of inflammation, as it affects *different textures* of the body; and the fact has been established, that even in its acute, and still more in its chronic form, inflammation frequently spreads extensively, lasts long, and produces decided lesions in one texture, without in the slightest degree affecting others in its immediate neighbourhood. Repeated observations on the bodies of those who have died of pleurisy, of bronchitis, of peritonitis, and of dysentery, as well as of more external inflammations, leave no room for doubt on this point. Formerly, the diagnosis of different inflammatory diseases seldom extended farther than the *organs* chiefly affected, and the functions of which were deranged; but we now consider the *texture* primarily affected to be one of the most important objects of inquiry, and to be frequently within the reach of careful scrutiny.

The variety in the course and effects of inflammation to be expected in different textures,—in the cellular, serous, fibrous, and mucous membranes, in the different parenchymatous viscera, the muscles, bones, &c. was first pointed out as a particular object of attention by Bichat in France and Dr. Carmichael Smyth in England; its importance was strongly inculcated by Dr. Gregory in his lectures; and our knowledge of these varieties in the different parts of the body, and of the symptoms by which the attacks of inflammation in the different textures may, in general, be first distinguished, has been greatly extended and improved by many other authors,—by Thomson, Abercrombie, Pemberton, Brodie, Travers, Hastings, and others in this country; and by Pinel, Corvisart, Bayle, Laennec, Rostan, Lallemand, Andral, Louis, &c. in France. The distinction of the different species of inflammation attacking the eye, and the accurate anticipation of the danger of each, by all the recent writers on the eye, furnish a beautiful example of the increased precision which the attention to variety of textures has given to pathology.

Farther, not only the effects to be expected from inflammation in the various textures have been ascertained by dissections, but characteristic *symptoms* resulting during life from these consequences of inflammation in several parts of the body, not open to ocular inspection, have been clearly pointed out by recent authors.

This is remarkably the case in regard to inflammations within the chest. The lesions resulting from these, as well as other organic changes in that part of the body, may certainly be very frequently ascertained by manual examination, and by auscultation and percussion, according to the methods of Laennec, with a precision formerly unknown. The usual effects of the inflammation of the pleura, and of the bronchiæ, may almost always be recognized and distinguished by percussion and auscultation; and there are many instances of these diseases occurring without any complication, which might formerly have been confounded under the general term pneumonia, and which it is not only satisfactory, but practically important, even in their later stages, to distinguish, because they admit of relief from different modes of treatment. There is, in general, more difficulty in forming a judgment as to the existence or extent of inflammation in the substance of the lungs; for this inflammation is very frequently combined with others within the chest; and although the "râle crepitant" and the "peripneumonic sputa" are occasionally well marked and characteristic symptoms, yet they are by no means to be depended on as constant symptoms. The effects of inflammation, either of the external or internal surface of the heart, frequently shew themselves unequivocally, on auscultation and percussion, and by the increased action and obvious enlargement of the heart resulting from them; but there are cases, particularly of the former, where much injury may be done, without such indications clearly presenting themselves, even to the most experienced observer.

One important result of the recent observations on the effects of inflammation within the chest is, the ascertained rarity of circumscribed collections of pus in the substance of the lungs, and the frequency of such collections exterior to the pleura; the established easy diagnosis of the two kinds of Empyema, the one with and the other without pneumothorax, from fistulous communication with the bronchiæ; and the distinction of the former class of cases of empyema, according as the communication has been opened from without inwards, in consequence of ulceration of the diseased pleura, or from within outwards, in consequence of tubercular disease and ulceration of the lungs,—the former of these two cases admitting sometimes of gradual cure, the latter being only an accident in the course of incurable phthisis.

Another important addition to our knowledge of thoracic disease is the discovery of the frequency, and explanation of the nature, of the change called Emphysema of the Lungs, as a consequence of long-continued Bronchitis, particularly when combined with spasmodic Asthma. All these improvements, as well as the original discovery of the application of the sounds heard in the chest to the diagnosis of its diseases, are to be ascribed chiefly to the industry and acuteness of Laennec.

The occurrence of inflammation of the Larynx and glottis in adults, tending to a fatal termination, by mere thickening of the membrane, by effusion of pus behind it, or by the œdema glottidis, without the formation of the false membrane of croup, is an important fact ascertained by the observations of Baillie, Farre, Lawrence, and many others; and the diagnosis of the cases of the kind in which the bronchi are unaffected, and an operation promises relief, is another advantage which the new methods of examining the chest afford.

The existence of inflammation of the Mucous Membrane of the great Intestines in all cases of dysentery, and of inflammation of the same membrane of the small intestines in a certain class of cases of diarrhœa, the diagnosis of inflammations of this membrane from those of the peritoneum, its remarkable tendency to ulceration, its frequent (though by no means uniform) combination with inflammation of the liver, particularly in the hot climates, and with continued fever in this climate, and the indications of its degree, and of its stage, to be drawn from examination of the stools, are important additions to our knowledge of abdominal inflammations, which we owe to the labours of Somers, Ballingall, Johnson, Robertson, and many other military and naval practitioners,—of Abercrombie, Cheyne, Harty, and others in this country, and of Petit and Serres, Broussais, Andral, Chomel, Billard, &c. in France. The instantaneous change of symptoms, violent pain, and rapid sinking, which succeed the perforation of intestine by an ulcer beginning in the mucous membrane, and effusion

of feculent matter on the peritoneum; the correspondence of this accident to the perforation of the pleura in phthisis, and the evidence, thence resulting, of variety of endowment of the serous and mucous membranes, are striking illustrations of the increased precision of our pathological information.

The varieties of inflammation within the Head, and of its results, have likewise attracted particular attention, chiefly since the publication of the writings of Lallemand and Rostan on the softening of the brain, certainly one of the effects frequently produced by inflammation there. The inflammation of the membranes may often be distinguished, by the acuteness of the symptoms, in its earlier stages, from that of the substance of the brain. Much more minute diagnostic marks have been proposed by the authors just named, by Bouillaud and others; but subsequent observations have shewn that on these no great reliance can be placed; and in fact, as the only symptoms which can yet be relied on, as indications either of inflammatory effusion or disorganizations within the cranium, are affections of sensation or voluntary power, and as these result only from changes at the base of the brain, therefore generally in parts at some distance from the actual seat of disease, and the affection of which may be said to be accidental, it is evident that there may be great variety in the symptoms, independent of varieties in the diseased states themselves; and accordingly, we cannot with any certainty anticipate either the nature or the exact seat of the effects of inflammation within the head, from any symptoms or combination of symptoms;—all that we can pretend to distinguish (and that not with absolute certainty) is the period of the disease when the symptoms no longer depend on the inflammatory action itself, but chiefly on effusions or disorganizations consequent upon it, and continuing after it has subsided.

2. The distinctions of inflammatory diseases according either to the organs or textures affected, and the usual effects produced in these, are not the only distinctions of practical importance in that class of diseases which have been elucidated by modern pathologists. A very important class of their observations relates to cases which, although running the usual course, and often with even more than the usual rapidity, are concealed or rendered *latent* by peculiarity of constitution, and can only be recognized with certainty by such unequivocal local indications of effusion or disorganization, consequent on inflammation, as those to which allusion has just been made. The circumstances in which these latent inflammations are most to be apprehended (which are in general those in which the system is much weakened, the quantity of blood lessened, and the sensibility blunted, as in the last stage of fever or of some of the febrile exanthemata,) are very important to be known, because, in some such cases, if the practitioner is on his guard, he may detect their existence while it is yet time to apply remedies.

Again, many important observations made by modern pathologists have given precision and authority to the statements of older writers, as to inflammations occurring and producing exactly their characteristic effects in various parts of the body, but running their course so slowly, as to take the form of *chronic* instead of acute disease; as in the case of cold or chronic abscess on the surface of the body; chronic pleurisy leading to extensive empyema, without either acute pain or inflammatory fever; partial inflammatory induration of the brain, or hepatization of the lungs confined to individual lobules, &c. The knowledge of this form of inflammation is obviously important, as suggesting and justifying a corresponding modification in the use of the usual antipathogistic remedies.

The term Sub-Acute Inflammation has also been properly applied by Dr. Armstrong and others to a form of truly inflammatory diseases of various textures, where not only the symptoms, general and local, are milder, but the local consequences which shew themselves much less extensive, than in the more decided and acute cases, and the amount of depletion necessary to avert danger is much less, while at the same time there is no such extension of the period of the disease as to justify the use of the term *chronic*.

3. What makes it peculiarly important to attend to these varieties in the intensity and duration of strictly inflammatory disease, even in the same parts of the body in different individuals, or at different times in the same, is the obvious application of this principle to other cases, where the symptoms are in the first instance those of inflammation, but the ultimate result is the establishment of other forms of disease,

which have been often regarded as quite distinct form, or even incompatible with, inflammation. Of this the most striking example is in the case of Dropsy, or serous effusion in various parts of the body, the connection of which with inflammation has lately been the subject of much inquiry.

The lectures of the late Dr. Gregory, and the writings of Rush, of Cheyne, of Abercrombie, and others, have satisfied the great majority of practitioners in this country, that the acute Hydrocephalus of Cullen is to be regarded in general as an inflammatory disease, although in many fatal cases no other effect of the inflammatory action can be found than the serous effusion into the ventricles; and the cases recorded by Blackall, by Abercrombie, by Crampton, and many others, have also shewn that there are many cases of general dropsy, beginning, or repeatedly renewed, by inflammatory attacks, and admitting of great relief from a certain extent of bloodletting, generally premised to, or combined with, the purgative or diuretic medicines. This practice, which had been repeatedly adopted by various practitioners, and again fallen into disuse, has been put on the proper footing by numerous dissections, which have shewn the very frequent complication of dropsical effusion with repeated inflammatory attacks, (often of the sub-acute or chronic character, but known by their usual products,) in the heart, lungs, liver, or kidneys; while, at the same time, these observations sufficiently demonstrate that any great extent of dropsical effusion is hardly ever the effect of inflammation *alone*; that some more permanent lesion of these parts is usually likewise present; and that, even when partly or chiefly dependent on inflammation in its origin, the effusion is very generally persistent long after this cause has disappeared.

Nor is dropsical effusion the only form of disease, usually regarded as chronic, to which we may confidently assert, (trusting to the information acquired by recent pathologists,) that inflammation may give rise, or into which it may graduate. Attentive observation shews that many of those organic changes of structure which are commonly called Obstructions in the more important viscera, whether combined with dropsical effusion or not, appear frequently to originate from the causes of inflammation, to be attended with some of the first symptoms of inflammation, and to combine themselves with, or graduate by insensible degrees into, the acknowledged effects of inflammation. It is true that in many other cases their invasion is quite gradual and insidious, and there is no evidence of more than mere "perversion of nutrition" in their developement; and that such organic alterations of texture likewise differ essentially from the simple effects of inflammation in being hardly at all liable to absorption, to which the simply inflammatory effusions are peculiarly prone; it is clear, therefore, that in every case there must be some condition, independent of inflammation, necessary to their production; yet the inference from the former class of facts is still a fair one, that an inflammatory action, generally of the sub-acute or chronic kind, is, in many cases, *one of the conditions* on which their growth depends. These points have been keenly discussed of late years by the French pathologists, particularly Broussais, Laennec, and Andral: the first of these authors certainly attributes too much to the "phlegmasies chroniques" as the cause of all chronic diseases; the second probably too little; and the conclusion now stated seems to agree very nearly with the opinion of the last, who is generally thought in this country the best informed and most judicious of the present French pathologists.

Of those cases of visceral organic disease, often connected with dropsy, and often originating in inflammatory action, there is one, the frequency of which was not suspected, and the indications of which were not understood, until very lately,—viz. the granulated or tuberculated state of the secreting portion of the Kidneys, first ascertained by Dr. Bright to be the almost inseparable concomitant of the albuminous state of the urine, which had been previously noticed by Dr. Wells, Dr. Blackall, and others, in many cases of dropsy, but which exists also, not unfrequently, without any dropsical symptom.

This discovery is the more important, as the effect of the diseased condition of the kidneys is to alter the nature and diminish the quantity of one of the great excretions from the body; from which results, as the experiments of Dr. Christison and Dr. Bostock have shewn, a palpably diseased condition of the blood, and an undoubted example, therefore, of the kind of morbid changes to be apprehended from such a cause. All that has yet been ascertained on this point is this, that when the urine is albuminous, and its specific gravity low, and the serosity of the blood therefore un-

turally loaded with urea, or extractive matter resembling urea, the health is always precarious, inflammatory diseases of different parts are apt to occur, and organic disease, particularly of the lungs or brain, frequently supervenes; and that in the last stage of such disease, when the secretion is almost suppressed, slight febrile symptoms rapidly advancing to coma, as in the true ischuria renalis, have been repeatedly observed.

Again, the tendency of inflammation, when it occurs in particular constitutions, to pass into, or give origin to, organic disease, is thought by many pathologists to be remarkably exemplified in the case of scrofulous Tubercles, and to be one of the principles, regarding the origin of that very frequent and fatal form of organic disease, which it is most incumbent on the practitioner, with a view to the prevention of such diseases, to have constantly before his eyes. On this point likewise there has been lately a difference of opinion both among French and English pathologists; and it is evident that tubercles frequently originate without either the causes or the indications of inflammation shewing themselves; and that the distinctions between tubercles and the usual effects of inflammation (particularly as to the subsequent liability to absorption) are such as to shew, that they can in no case be ascribed to inflammation as their sole cause. But when all these admissions are made, it may still be held as a principle of the highest practical importance, that in certain constitutions or in certain circumstances, an inflammatory attack, if not very speedily remedied, is very likely to act as the immediate cause of a deposition of tubercles, and consequent chronic and nearly hopeless disease.

The nature of the peculiarity of constitution, which disposes to this rather than other consequences of inflammation, is in all probability to be sought in the composition and vital properties of the blood; and some of the microscopical observations of Gendrin, (particularly that of the presence of translucent globules in the fibrinous effusions of healthy inflammation, and their absence in incipient tubercles,) seem to afford a fairer prospect of successful investigation of this point than any former observations had given. In the meantime the external causes, which particularly favour the developement of that constitutional peculiarity, and especially the relative efficacy of climate and of impure air, imperfect nourishment, and deficient exercise, during childhood and youth, in producing it, have been illustrated by statistical inquiries, of the kind formerly mentioned, which are necessarily much more valuable, in this view, than the records of the experience of any individual.

Besides the connection of inflammatory action with various forms of organic disease, of which we have thus spoken, much stress has been laid by some recent authors on increased determinations of blood, approaching and sometimes amounting to inflammation, as a main cause of many chronic diseases which are merely *functional*, e.g. of neuralgic pains, of different spasms, of dyspepsia and other effects of deranged secretions in the *primaæ viæ*. This speculation has pretty certainly been carried too far by some, particularly by Broussais and his followers in France, and by the late Dr. Parry in this country. In many such cases it seems certain that the increased determination of blood is the consequence, not the cause, of other derangements of vital action; yet that it often occurs and aggravates the evil, and affords a fair indication for practice, seems well ascertained; and the remarks of Dr. Parry on the beneficial effects of spontaneous haematemesis in some cases of urgent dyspepsia, and the accurate observations of Dr. Wilson Philip on the effects of local bleedings in what he calls the second stage of dyspepsia, may be quoted in proof of this position.

4. Another important set of observations on inflammatory diseases consists of those which have been made on the characters, and progress, and peculiar dangers of Specific Inflammations resulting in general from particular causes only, and differing from the usual form of inflammation in the nature of their local symptoms and effects, or in the character of the accompanying fever, or in both these particulars.

The distinction of Phlegmonous and Erysipelatous inflammation in external parts, as well as of the specific cutaneous inflammations of the exanthemata, had indeed been long known, and our knowledge of the great variety of inflammations affecting the skin has been greatly extended and corrected, particularly by the labours of Willan and Bateman. But even Dr. Cullen, who referred the erysipelas, with great propriety, to his class of Exanthemata rather than Phlegmasiae, and considered the fever attending it as by no means symptomatic of the inflammation, but as resulting from a cause acting in the interior of the system, and of which the inflammation was likewise an

effect, had not a correct view of the peculiarity of the inflammation itself. He supposed that peculiarity to depend merely on the texture affected; the true skin being, according to him, the seat of this inflammation, while the phlegmon is seated in the cellular membrane. He did not advert to the circumstance, that the *disposition to spread* along the surface, and the *deficiency of organizable lymph* in the inflammatory effusion, were local symptoms equally peculiar and characteristic of this inflammation, as compared with other inflammations of the same texture, as the priority of the febrile symptoms, and their frequently typhoid character; and therefore did not form the notion which French pathologists annex to the term *specificité*, as applicable to this form of inflammation.

Subsequent inquiries have, however, distinctly shewn, that this principle is of real and great importance, as applicable both to this and other inflammations. It appears from the researches of the late Dr. Duncan, of Mr. Travers, Mr. Lawrence, Dr. Butter, and others, that when this inflammation extends from the skin to the *cellular membrane*, as so frequently happens in erysipelas, it preserves the same local characters in the latter texture as in the former; that in some cases this kind of *diffuse* inflammation affects the cellular membrane extensively without extending to the skin; that it often prevails epidemically, and is certainly sometimes propagated by contagion or inoculation; that it may arise from different peculiar causes, of which the most frequent seems to be the introduction into the system of some kind of animal poison, as in the case of poisoned wounds from dissection; that in this as in other cases, when such a poison acts on the body, a peculiar derangement of the nervous system and depression of the vascular system are very often observed, giving to the fever attending such inflammation the character to which we apply the term *Typhoid*; and that there is frequently a danger from this form of fever, quite independent of that which the local inflammation could effect; and not to be remedied, sometimes even to be aggravated, by the use of means for subduing that local inflammation.

Farther, it seems well ascertained that on internal membranes, and sometimes in connexion with this erysipelatous inflammation on the surface, there are examples of a similar *diffuse* form of inflammation, tending to serous and sero-purulent effusions chiefly, not to exudations of organizable lymph, and that the fever attending this inflammation is more or less perfectly *typhoid*; and the danger resulting from it so little in proportion to the intensity or duration of the inflammation, that in the most rapidly fatal cases the inflammatory appearances found on dissection are generally the least obvious.

Such examples of internal erysipelatous inflammation may in some instances be pretty certainly distinguished from the more usual form of inflammation in internal parts; they have been most decidedly observed in the peritoneum; and the epidemic and contagious Puerperal Fever, although not the only case of the kind, is that to which the foregoing remarks most particularly apply; but in this as in other contagious diseases, there appears to be great variety, in different epidemics, particularly as to the extent to which the inflammation goes, and to which the remedies for inflammation may be safely carried.

These statements appear to be fair deductions from the facts stated on this subject by Armstrong, Hey, Mackintosh, Campbell, and others, who have witnessed extensive epidemics of this kind, particularly when compared with the cases of this form of peritonitis, (sometimes evidently in connection with erysipelas) recorded by Dr. Abercrombie, and with several that have fallen under the observation of the present writer.

There is strong reason for thinking that there is something equally peculiar or specific in the inflammation of Dysentery, when it prevails epidemically, and when it extends itself (as the writer is satisfied he has occasionally observed) by contagion; and it seems quite certain that a peculiar spreading inflammation of the mucous membrane of the fauces, tending to a peculiar aphthous exudation on its surface, and attended with a dangerous typhoid fever, sometimes prevails epidemically, as in the experience of Dr. Bretonneau of Tours, who gave it the name of Diphtherite.

In all these cases it may be at least reasonably conjectured that a peculiar animal poison is either introduced into or generated in the blood, which circulates through the system, and by its depressing or sedative influence causes the peculiarities, both in the local and the general symptoms, and progress of the disease, which distinguish it from simple or *healthy* inflammation of the same parts. It is an important observation,

first put in a clear view by Mr. Travers, that a similar peculiarity is given to the *general* symptoms resulting from external injuries, by the influence of a violent concussion or shock, affecting the system at the time when such local injuries are received; but it may be doubted whether the term Irritation, applied by him to the constitutional affection, either from such injury, or from specific inflammation, is the best that could have been chosen. The rapidly spreading Traumatic Gangrene described by Larrey and others seems to be an effect produced in some cases on the local inflammation consequent on a violent injury, by the concussion which has such an influence on the constitutional symptoms; and indeed more or less of gangrene or sloughing is always to be apprehended from inflammation excited in a system where the powers of the circulation are remarkably depressed.

That an animal poison, circulating and multiplying itself in the blood, is an adequate cause both for the local peculiarities and for the peculiar typhoid symptoms, attending the specific inflammations above noticed, appears pretty certain, not only from the analogy of the contagious exanthemata and their communication by inoculation, but also from what is observed as to the effects of inflammation affecting the lining membrane of Veins, where much of the inflammatory effusions must necessarily be mixed with the circulating blood. In this case, even although the vein has inflamed from a simple injury, without evidence of any specific cause having been applied, such typhoid symptoms, according to the observations of Hunter, of Travers, James, Arnott, and many others, seem almost invariably to occur. Indeed, as the veins of the uterus have been found inflamed in several cases of puerperal fever, it has been suspected by Dr. Lee that that disease may be generally dependent on this cause.

Another observation which has been made on cases of inflammation of the veins, by Mr. Arnott and others, is likewise of great importance. It has been found that this inflammation is very frequently followed by rapid inflammation, and still more rapid purulent depositions in distant parts, particularly in the cavities of joints, or in internal cavities; and it seems probable that it is in this way that we are to explain the occurrence of such rapid inflammation and suppuration in internal parts, particularly the Liver, which has been often observed after severe injuries of the head or other parts of the surface.

This observation ought evidently to be taken in connection with another, made by many recent authors, by Guthrie, Rose, and others in England, and by Dance, Velpeau, &c. in France, of the frequency of internal inflammation, going on with extreme rapidity to deposition of purulent or tubercular matter in internal parts, immediately after the amputation of a limb, where such formations from the blood had been previously established; and both observations should be taken in connexion with the facts, which seem established by the researches of Velpeau, Kaltenbrunner, Gendrin, and others,—*first*, that the veins leading from extensive collections of matter, especially in chronic cases, are often found loaded with pus; and, *secondly*, that the conversion of globules of blood, or of fibrine, into pus, takes place not only in extravasated effusions, but *within the vessels* of parts in a certain stage of inflammation.

The inference from all these facts appears to be, that purulent matter generated in the human body itself, if by any means it is caused to circulate in the blood without finding a ready outlet, disposes not only to peculiar febrile symptoms, but also to inflammation of a peculiar character, which goes very rapidly to extensive suppuration, in whatever part may be most prone to such disease; and this is evidently an important addition to our knowledge of Specific Inflammations, and is applicable, as will presently appear, to several cases of the most important chronic diseases.

The inflammation of Syphilis is another example of specific inflammation resulting apparently from a morbid poison circulating in the blood, and falling on particular textures; and in regard to this several points of great importance seem to have been ascertained by the observations of Abernethy, Pearson, Rose, Guthrie, &c. in London, of Carmichael in Dublin, of Dr Thomson in Edinburgh, and others, particularly the variety of its forms and progress in different individuals even at the same time, and the more gradual change of the character of the disease and malignity of the virus in the progress of time; the fallacy of the old opinion that in any of its forms (as they now present themselves) the disease is absolutely void of natural tendency to a favourable termination; the variety of treatment which its different forms demand; the frequent combination of syphilitic inflammation, either with healthy inflammation on the one hand, or with scrofulous disease on the other; the aggravation of the disease, in either

case, which may result from the use of mercury; and the proper restriction of the virtues of this medicine, in regard to syphilis, to the character of an *alterative* rather than an *antidote*.

The inflammation of Gout is another to which the term Specific is properly applied; and the important discovery of Dr. Wollaston, of the existence of uric acid in the concretions which result from long-continued gouty inflammation, at once tends to explain the known connexion of gout with the calculous diathesis, and connects this with the other specific inflammations dependent on a morbid matter in the blood.

The inflammation of Rheumatism may also be held to be strictly specific, although the existence of any peculiar ingredient in the blood cannot be ascertained. That there is something peculiar in the vital constitution of the blood in this disease appears, however, to be rendered highly probable by the nature of the peculiarities that most remarkably distinguish it; by the tendency to affect different parts and textures in rapid succession; by the total absence of suppuration as an effect of this inflammation; by the apparently increased proportion of the fibrine, and complete separation of it from the red matter in the blood drawn, and by the remarkable proportion of fibrine in the exudation produced by this inflammation when it affects the heart. The frequency and danger of the affection of the heart and pericardium in this disease has been completely established by the observations of Pitcairn, Dundas, Wells, Davis, Abercrombie, and others, and is one of the important additions lately made to pathology. The circumstances in which it is most to be apprehended are by no means so clearly made out; but the writer has no difficulty in stating his conviction, that large and repeated bleedings in the beginning of rheumatism increase the risk of this metastasis; and in assenting to the observation of Dr. Elliotson, that after it has occurred it is more properly met by local than general bleedings. The labours of Willan and Bateman have been more successful than those of any others in distinguishing the many different forms of inflammation (particularly chronic) to which the skin is liable, but the classification of these diseases, which they have attempted, is more formal and precise than the nature of these ever-varying forms of disease will justify.

5. The great improvements which have been thus effected in our knowledge of the history and varieties of inflammatory diseases are of practical importance in the treatment of such diseases, not by suggesting new remedies, but chiefly by giving us more precise information than we could otherwise have had, of the particular danger which is threatened in each case of such diseases, and of the particular symptoms indicating such danger; and thus guiding us as to the proper time and the proper extent of the application of those, which we already possess and understand. Many attempts have been made, during the period under review, to add to the number of the general antiphlogistic remedies, or of those adapted to particular inflammatory diseases; and it is generally thought that some important auxiliaries to bloodletting and the other evacuations have been discovered; but it must be owned that there has been no such decided success in this inquiry as in those of which we have already spoken: and although it is right to avail ourselves of these auxiliaries in all cases where evident contraindications to them do not exist, yet, as a general rule, in the early stage of inflammatory diseases the less that is trusted to them, and the more to the ordinary means of depletion, the better.

This observation may be particularly applied to the use of Mercury in inflammatory diseases, which has been so highly recommended as a remedy for inflammations by Hamilton of Lynn Regis, Armstrong, Travers, and various other practical authors within the last half century, that its virtues might be supposed to have been completely ascertained; but those who are aware of the fallacies attending the observation of the effects of remedies in acute diseases, particularly of such as are only employed as auxiliaries to others of acknowledged efficacy, can easily understand that they may have been much overrated. It has been often represented that not only the purgative mercurial medicines, as general evacuants, and as means of acting particularly on the secretion of the liver, are of peculiar importance, but the action of mercury on the system at large is the surest means of controlling those effusions, and particularly the effusion of coagulable lymph, on which the danger of several inflammatory diseases essentially depends; and in some instances a less defined and more specific virtue in checking inflammation has been attributed to the constitutional affection from mercury. Thus the remedy has been successively vaunted in the case of acute hydrocephalus, of

cynanche trachealis or laryngea, and (generally in the form of calomel and opium) in that of pneumonia, bronchitis, pleuritis, pericarditis, peritonitis, hepatitis, and dysentery; and reference has been often made to the effects which may be observed from it in inflammation of the iris, tending to effusion of lymph there, as demonstrative evidence of its peculiar efficacy.

But it may be stated with confidence, that in the opinion of many of the best informed members of the profession, there has been much exaggeration in all these statements. That there is something very peculiar in the effect of mercury on acute inflammation, particularly of the liver and of the mucous membrane of the bowels, in the hot climates, the numerous and concurrent authorities which might be quoted on the subject leave no reason to doubt; but that any such decided effect can be observed from exciting the specific effects of mercury (marked by its action on the mouth) during the acute stage of any internal inflammation in this country, has certainly not been established to the satisfaction of most practitioners. That calomel is one of the most convenient purgative medicines in such diseases is certain, and it is equally certain that it is one of the best *corrigents* that can be used along with opium, when the soothing effects of the latter medicine are demanded; because it both corrects its constipating effect, and probably aids in determining its action on the skin, and, when given with opium, much more generally represses than excites vomiting. When given so as to act only in these ways, it may be unquestionably held to be a useful, though not one of the most powerful remedies in inflammatory diseases. But when its action on the mouth has been excited in the course of acute internal inflammation, (which is the only fair way of judging of any specific agency of the mineral on the inflammatory process,) we have not only been very generally disappointed of seeing any improvement of the symptoms immediately follow that change, but are constrained to add that we have more frequently seen an aggravation of them.

In more chronic inflammation, attended with slighter febrile symptoms, or when strictly a local disease, and tending obviously to gradual deposition of coagulable lymph, it is generally allowed that a certain degree of deobstruent rather than antiphlogistic efficacy (unfortunately often inadequate to the evil to be overcome) is attributable to the agency of mercury on the constitution. It is in those cases of syphilis where chronic induration around the ulcers is the most characteristic appearance, that the beneficial action of mercury is in general most distinctly seen; and not only in the case of iritis, but in inflammation of the periosteum, of the larynx, of the liver, perhaps of the peritoneum, when sub-acute or chronic, a similar beneficial influence is sometimes distinctly perceptible. Two cautions, at least in this climate, are, however, certainly important: *first*, that a dysenteric affection of the bowels is often produced by mercury affecting the system; and, *secondly*, that it very often acts as a cause or aggravation of scrofulous disease, in those who have that very common tendency.

Another auxiliary to bloodletting in inflammatory diseases, particularly in inflammations of the chest and in rheumatism, which has come into pretty general use in this country, is the solution of tartar emetic, given in frequently repeated and often large doses, but without exciting vomiting. The possibility of patients in inflammatory diseases taking very large quantities of this and many other medicines, particularly if they be not largely bled, without the usual effects of these medicines showing themselves, has been abundantly demonstrated by the experience of Rasori and many other Italian physicians, and of Laennec and his followers in France; but whether there is any peculiar advantage in establishing this "tolerance" of the medicine, and then trusting to a remedy which produces no sensible effects, is a very different question. Under the impressions that we have in this country of the efficacy of bloodletting in acute inflammations, and of the comparative inadequacy of all other means yet proposed, we do not think ourselves justified in placing our chief reliance on this treatment, excepting where the loss of blood is clearly and strongly contra-indicated. When bloodletting is pretty freely employed, much smaller quantities of the tartar emetic than the continental physicians are in the habit of prescribing are found with us to excite and maintain nausea; and it certainly has not been shewn, to the satisfaction of the practitioners in this country, that the medicine, in any way in which it can be given without sensible effect, is a more powerful antiphlogistic than when used so as to maintain nausea for hours together. When given in this way, (for which purpose from one-third to one half of a grain every two hours will usually be found

sufficient,) it is now generally regarded as the most powerful auxiliary to bloodletting in the diseases above mentioned, and in particular has in a great measure superseded the use of Digitalis as a sedative and antiphlogistic; the general judgment in regard to this last being, that in moderate doses it is inefficient in this view, and in large doses unmanageable and hazardous.

The Colchicum is another medicine introduced within the last twenty years into practice, with the character of an antiphlogistic or sedative rather than an evacuant; and in the case of a fit of Gout, the effect of a few doses of this medicine is certainly often more nearly specific than that of any other medicine which we can mention, in an inflammatory disease. But experience, as well as theory, might be quoted in favour of the doctrine, which was keenly advocated by the late Dr. Gregory in his lectures on gout, that the human body always becomes peculiarly liable to other and more dangerous diseases, when the attacks of gout are arrested in any other way than by the regimen which corrects the tendency to the disease. The antiphlogistic virtues ascribed to colchicum in other inflammatory diseases are much less generally admitted; but it is generally thought that, by the continued use of this medicine, attacks of acute rheumatism may in many persons be somewhat alleviated and shortened.

A change, and, in the opinion of the present writer, a very material improvement has taken place within these few years in the judgement of many practitioners as to the use of Opium in abdominal inflammations, whether affecting the serous or mucous membrane. It has been clearly shewn by Dr. Armstrong and others, that when full bleeding has been premised, opium may be given freely and repeatedly, often with extremely good effect as to the relief of suffering; certainly without any injurious effect on the alvine evacuations, (which seem frequently to be promoted or procured more easily by enemata after the use of opiates;) and it may be pretty confidently asserted, with a considerable diminution of the mortality below what is common when bloodletting and purgatives are the only remedies employed. It is very doubtful, however, whether the notion of Dr. Armstrong, that opiates are here of use by their diaphoretic agency, is the correct one. In the cases which the present writer has observed, the beneficial effect of the opium has been best marked when the pulse has been early much depressed, and has not risen after bloodletting, so that farther loss of blood has seemed hazardous or impracticable. When opium in these circumstances has quickly relieved pain and vomiting, and procured sleep, the pulse has frequently improved beyond expectation; and a patient who previously seemed quite exhausted has been restored to a state in which farther bloodletting, if required, has been perfectly well borne. That opium, as an auxiliary to bloodletting in these inflammations, can lessen the quantity of blood required to be drawn is very doubtful; but, unless the writer is greatly mistaken, it may be confidently asserted that it will enable patients to bear a loss of blood under which they would otherwise have sunk, and thus permit the effectual remedy to be applied repeatedly, and ultimately with success, in cases where it would otherwise have become inapplicable. Of this the writer has been convinced, not only by finding the mortality from the disease under his own observation less since he has given opium freely, (which might have been accidental,) but especially from observing that in the cases which proved fatal under this treatment, the extent of inflammatory appearances found on dissection has always been great and unequivocal; very often indeed these have been complicated with organic disease; whereas, before he adopted this kind of practice, he has repeatedly had the mortification of seeing patients sink early in the disease, in whom the inflammatory appearances found on dissection have been remarkably slight*—certainly less than must have existed in other cases, where recovery took place. Death in cases of abdominal inflammation does not depend, as in most other internal inflammations, on the lesion of any organ essentially concerned in maintaining the fundamental function of circulation; it results from a sympathetic affection of the circulation consequent on the inflamed state of the intestines; it can be demonstrated that this sympathetic affection is much greater in some persons than in others, suffering under the same amount of abdominal inflammation; and it seems reasonable

* It is proper to state that the writer has been oftener disappointed of the effects of opium in acute dysentery than in peritonitis, and that in some cases of the latter disease which he has seen prevailing epidemically, and as he believes spreading by contagion, he has also found it quite inadequate.

to suppose, that whatever blunts the intensity of the sensations, produced by the disease in the bowels, and procures ease and sleep to the patient, will lessen the degree of that sympathetic affection of the circulating system. It should always be remembered, (whatever judgement be formed of this or other individual remedies,) that it is not by interrupting the functions of the bowels themselves that acute enteritis is fatal; that restoring the functions of the bowels is therefore only a secondary object, requiring little aid when the main object can be accomplished, and certainly not to be urged as long as there is a risk of the means used to accomplish it aggravating the inflammation. In this respect a useful practical caution may be fairly deduced from the more accurate knowledge we now possess of the causes of death in inflammatory diseases.

The advantage of local bloodletting by punctures or incisions, in those cases of diffused inflammation of external parts, which threaten to be dangerous by extensive suppuration and sloughing, has been established by the observations of O'Halloran, Copland, Hutchinson, Lawrence, Duncan, and many others.

The additions recently made to our knowledge of Idiopathic Fever may be put in a smaller compass than those which regard inflammation, because the study of morbid anatomy gives us much less assistance in this inquiry, and notwithstanding the amount of labour bestowed on it, much less real and definite improvement has been effected.

It has been ascertained, chiefly by the labours of the French pathologists, but likewise by those of many authors on Fever in London, Dublin, and Edinburgh, that the lesions most generally found in fatal cases of what is usually called Continued Fever, in Europe, are serous effusion in the ventricles and between the membranes of the brain; an increased vascularity, with increased secretion of mucus, on more or less of the bronchial membrane; an oedematous, and often a condensed and softened state of part of the lungs; and thickening, patches of vascularity, and partial ulceration or sloughing, of some part of the mucous membrane of the *primæ vīe*, especially of the glandular structure there, and most frequently at the lower part of the ileum, often attended with enlargement of the corresponding mesenteric glands. The blood found in the body, or drawn from it during life, very generally, if not uniformly, coagulates less firmly than in health, and sometimes, especially in cases rapidly fatal, is nearly fluid. All other morbid appearances are comparatively rare, and several appearances, particularly congestion of blood in the back part of the lungs and in the mucous membrane lining the depending portions of the intestines, are fallacious; depending on the stagnation of the blood in these parts, both after death and in the extreme stage of debility before death, and on the imperfect coagulation of the blood.

It seems to be also ascertained that the whole of these appearances are seldom found in any one case; that those found are often remarkably various in different individual cases, although a great portion of the symptoms may have been very similar; that although all these appearances are such as occur in decided inflammations and form part of their character, yet the effusions of coagulable lymph and of pus, which are those most characteristic of inflammation, are very rarely found after fevers, and that after some cases of well-marked continued fever these morbid appearances are altogether absent.

The question that has been most keenly debated of late years, both in France and this country, is, whether all the symptoms of continued fever can be ascribed to the influence of local inflammations in some part of the body, and what is usually called Idiopathic fever be thus resolved into Symptomatic; or whether fever is a general disease of the system, with which certain local inflammations, sometimes in one part and sometimes in another, frequently combine themselves. The former doctrine has been warmly espoused by Broussais and his followers in France, and by Dr. Clutterbuck, Dr. Mills, and others, in this country; but the opinion of some of the most eminent of the Parisian pathologists, and of the school of Montpellier, and the general opinion of the profession in this country, is decidedly in favour of the latter; principally for the following reasons, which, it will be observed, are chiefly taken from the history of the disease as known from observation of the living body, and have been, therefore, too much neglected by those whose notions of pathology are limited to observations on the dead body, and the inferences thence directly resulting.

1. The cases to which we give the name of Fevers may be distinguished in practice, and in general without difficulty, if their whole progress is traced, from the other cases in which inflammations of the same parts are found on dissection; by the slighter degree

of the local symptoms, as compared to the intensity of the general symptoms ; by the greater depression of strength, and particularly the easier depression of the strength of the circulation ; by the greater deficiency of secretions, as shewn, after some days, by the dryness of the mouth and tongue ; by the greater disturbance of the nervous system, and greater prevalence and peculiar character of delirium, generally blended with a peculiar tendency to stupor ; by the imperfect coagulation of the blood, or aggregation of the coagulum ; and not unfrequently by the appearance of a peculiar cutaneous eruption.

2. The cases of fever, thus characterised, are found to be generally of local and temporary existence among mankind, and are for the most part distinctly referable either to a malaria or a contagion ; and thus, in their origin as well as their symptoms, bear an analogy to the effects of certain Poisons on the living body ; whereas cases of Inflammation, resembling the effects of injuries or accidents rather than of poisons, occur in pretty uniform frequency in all great communities, similarly situated as to climate and habits of life.

3. When the cases, which are thus characterised as fevers, prove fatal, the appearances on dissection are very generally slighter, (particularly in the circumstance already remarked, of the general absence of the most characteristic inflammatory effusions,) than those which we are accustomed to see in the cases to which we give the name of Inflammations ; therefore they do not afford so satisfactory an explanation of the fatal event ; and occasionally they are altogether absent.

4. The cases, thus characterised as fevers, have a much greater tendency to spontaneous favourable termination, than is seen in cases of undoubted inflammation, where the same internal parts are affected, and the same amount of febrile symptoms exists ; as is seen in the regular decline of the paroxysms of intermittents, and in the frequent decline of continued fever, with or without critical evacuation, where no active remedies are used.

5. The decline of the cases characterised as fevers very often takes place under the use of stimulating remedies, which are known by experience to be hurtful in similar stages of undoubted inflammations ; so that the experience of the *juvantia* and *laedentia* clearly indicates a distinction of these diseased states.

6. When patients recover from the worst stage of the cases characterised as fevers, with little or no artificial evacuation, or under the use of stimulants, experience shews that the health is more perfectly restored, and that there is much less risk of organic diseases succeeding them, than may always be apprehended when recovery takes place from decided and dangerous internal inflammation, under a similar treatment.

These considerations would entitle us to regard fevers as specifically different from inflammations, even if certain inflammatory appearances on individual parts of the body attended the general febrile symptoms as uniformly in them, as in the contagious exanthemata ; but this conclusion is much strengthened by the fact already stated, that the parts of the body in which inflammatory appearances may be found after death from fevers are remarkably various ; and by the observation, which may easily be made in such fatal cases, that the only symptoms which can be certainly connected with the appearances on dissection, particularly in the chest or abdomen, are often symptoms occurring late in the disease, and sometimes apparently supervening, from known causes, on the original affection.

In regard to the essential nature of the morbid state, which is thus properly distinguished, both in theory and practice, from the effects of inflammation, we cannot say that more progress has been made of late years, than in regard to the essential nature of the progress of inflammation itself. As, indeed, all explanations are founded on comparisons, and as the phenomena in both these cases hardly admit of comparison with any others in nature, it is not to be expected that this investigation can ever be carried far. And as it is generally allowed that fever (both symptomatic and idiopathic) originates in the capillary vessels, i. e. in that part of the living frame which is the seat of the functions hitherto involved in the greatest obscurity, pathologists have been naturally and properly deterred from prosecuting the inquiry, until this department of physiology be farther elucidated. It may be stated, however, that the account given by Hoffmann and Cullen, of the *febrile reaction* consequent on the diminution of secretions and excretions in the commencement of fever, of the increased stimulation of the heart being consequent on obstructed circulation in the capillaries,—may still be held to be so far satis-

factory;* but that the idea of a Spasm of the extreme vessels being the immediate cause of that diminution and obstruction, and thereby of the increased stimulation of the heart, has neither been confirmed by any actual observations, nor generally regarded as a satisfactory account of the phenomena; and perhaps the least theoretical expression of what is known on the subject is merely this, that there is, in the commencement of fever, a deficiency of the vital actions in the capillary vessels, naturally followed by increased excitement of the heart; and that, in the case of idiopathic fever, this is combined with the peculiar sedative agency of a poison, generated in or absorbed into the blood, the effect of which varies remarkably in intensity on different occasions, and is often very dangerous; although, like that of other poisons introduced into the system, it is essentially transient.

The most important improvement which has been lately effected in our knowledge of idiopathic fever, as in the case of inflammation, may be said to consist in the more accurate discrimination of its Varieties; and the most important of these may be ranked under the following heads.

1. Certain distinctions, of obvious practical importance, have been pointed out as to the intensity and succession of the proper febrile symptoms themselves. The variety described by Dr. Armstrong, Dr. Bateman, and others, under the title of Congestive, though perhaps improperly named, may sometimes be distinctly recognized, both in cases of fever and of the contagious exanthemata; and may be said to be that in which the sedative agency of the remote cause of the disease acts with extreme force, the usual reaction is suppressed or obscured, and the symptoms of the first or cold stage assume their maximum of intensity; the chief appearances being, feebleness of circulation and of muscular strength, coldness of surface, and stupor or confusion of thought resembling the first effect of concussion of the brain rather than the usual febrile delirium.

Again, the distinctions drawn by French authors, between the Fièvre Adynamique, in which the weakened state of the circulation,—the Fièvre Ataxique, in which the disorder of the nervous system,—and the Fièvre Inflammatoire, in which the degree of febrile reaction,—is the predominant character, although not essentially different from those by which the Low or Putrid Fever, Brain or Nervous Fever, and Inflammatory Fever, had been previously characterised in this country, are yet important; both as familiarising practitioners to these varieties, and to the causes which may sometimes be assigned for them, and as giving something more of precision to the use of these terms.

2. Numerous and accurate observations have been made, particularly by Drs. Perceval, Cheyne, Grattan, and other Dublin physicians, Drs. Bateman, Tweedie, and others in London, and Andral, Chomel, and Louis in France, confirming and extending those of Sydenham, on the more complicated forms of fever, in which the symptoms denoting or threatening local inflammation in the head, chest, or abdomen, combine themselves, either from the first, or at different periods during the disease, with those of the idiopathic fever; and it has been clearly shewn that it is by no means exclusively with the inflammatory form of the general febrile symptoms,—firm pulse, hot skin, &c.—that this combination may take place; but that, on the contrary, the danger in a majority of the worst cases of fever in this climate depends on a complication of local affections, which, if standing alone, would demand the remedies for inflammation, with general symptoms, which, if standing alone, would as clearly demand stimulants.

The observation of such varieties in the general symptoms and in the local concomitants of fever is especially important when taken in connection with the varieties in the symptoms which, in the fatal cases, immediately precede death, the different modes of fatal termination to which different cases obviously tend, and the different kinds of practice which are, therefore, evidently demanded. When we see, for example, that some cases of fever are fatal within a few days from their commencement, with the pulse full and the skin hot almost to the moment of death, and headach-

* Perhaps the most striking fact which can be stated in support of that doctrine is the rapid abatement of the symptoms, and shortening of the period, of a paroxysm of intermittent fever, observed by Dr. Mackintosh and others to result from bloodletting in the cold stage, which will necessarily lessen the amount of stimulus then acting on the heart.

and delirium, followed by stupor, as the most prominent symptoms; and that others are fatal only at the end of several weeks, the pulse being feeble, or very easily depressed, the skin cool or easily chilled, and the body wasted by inanition, or more quickly reduced by diarrhoea, for many days before death, but the head clear almost to the last; it becomes obvious that Dr. Cullen's memorable injunction, to form the indications on "the means of obviating the tendency to death in fever," must be followed by very different means. Perhaps the most systematic account of the different modes of fatal termination which are to be expected in fevers, and by the expectation of which the practice must be chiefly regulated, is to be found in the work of Hildebrand on *Typhus*.

3. The observations, begun by Sydenham and others of the older authors, on the comparative frequency and mortality of the different forms of fever at different ages, in different climates, different seasons, or in different epidemic visitations of the disease, have received many important additions.

The last-mentioned point is, perhaps, that on which it is the most important to have certain information. In the fevers of the hot climates, for example, it appears distinctly from numerous practical observations, that in some seasons the danger is chiefly from the rapid increase of symptoms denoting an inflammatory action at the brain and at the liver or stomach, headache, delirium, stupor, pain and tenderness at stomach, urgent vomiting, &c. and that these symptoms are safely and effectually met by full evacuations; but it seems equally certain that, on other occasions, and in the more malignant epidemics, the febrile depression is more formidable, the depleting practice less effectual, the danger of debility from it much greater, and stimulating remedies sometimes (though unfortunately seldom) obviously successful.

The present writer can say with confidence, from his own observation, that the fevers which were prevalent in Edinburgh from 1815 till 1820 were materially different in character from those which have prevailed since 1825; that at the former time the pulse generally preserved a greater degree of firmness throughout the disease; that when death occurred, it could be more distinctly ascribed to the inflammatory complications; that bloodletting was better borne, and seemed much more decidedly useful; and that the indications for the use of wine, and the benefit from it, were much less frequently seen. When the statements of Dr. Welsh on the fever of 1817-18 in Edinburgh are compared with those of other practical observers, either of former or later epidemics in Scotland, it will probably be admitted that the observation now made is in conformity with the experience of others. About the former period, several of the best observers, Dr. Duncan in Edinburgh, Dr. Bateman in London, and many of the military and naval practitioners, exerted themselves to shew the safety and efficacy of bloodletting in fevers, even of the typhoid type; but in many of the fevers prevalent since that time, caution has appeared equally necessary in regard to bloodletting, and wine has seemed equally useful and important as in the days of Huxham or of Gilchrist. And it is only by such observations that we can be duly impressed with the importance of the practical cautions given by Sydenham, by Cullen, and others of the older authors, as to the importance of attention to *the nature of the prevailing epidemic*, in regulating our practice in fevers.

What has been said of the connection of fever with the local inflammations frequently attending it, may be applied likewise to the *Contagious Exanthemata*, in which there is a similar combination of general febrile symptoms, consequent on the introduction of a poison into the blood, with peculiar local inflammations, chiefly of mucous membranes, but these are of a more definite character, both as to seat and duration, than in the former case. In these, likewise, a remarkable variety of epidemics, as well as of individual cases, has been repeatedly observed of late years; of which the peculiarly malignant or typhoid measles, prevalent in Edinburgh in 1807-8 and in 1815-16, were striking examples. The idea entertained by Dr. Watt and some others, of an increased mortality from measles compensating for the diminution of mortality in early life which had been effected by vaccination, seems to have been a hasty inference from the observation of such an unusually fatal epidemic, and has fortunately received no confirmation from subsequent experience.

The malignant Cholera, which has been the object of so much attention within these few years, has all the characters of a disease proceeding from a peculiar or specific poison, whatever the source of that poison may be. Many of its symptoms approach

nearly to those of the congestive form of fever above mentioned; and the typhoid symptoms and strong tendency to stupor, observed very generally in this country in those who recovered from the stage of collapse, clearly indicate its analogy to the worst febrile epidemics.

It is obvious from what has been said, that much has been done in the last half century to increase the number and the precision of the data, by which we are habitually guided in the application to individual cases of this class of diseases, of remedies of known and acknowledged power, *e. g.* bloodletting, general or local, purgatives, nauseating medicines, counter-irritants, stimulants; and it were unreasonable to doubt that in this way the efficacy of medical treatment over these diseases, in the practice of intelligent and judicious men, has been gradually and considerably increased. We must ascribe much less to the peculiar efficacy of any new remedies recently introduced. The application of Cold in the early stage of Fever and of Scarlatina is one of those from which the most beneficial results have been anticipated, and the temporary efficacy of this remedy, and the safety of applying it during the stage of greatest vascular excitement, in the simpler or less complicated forms of these diseases, were ascertained by Currie and many others; but a careful observation of the "modes of fatal termination" of these diseases is sufficient to shew that the cases to which this remedy can be safely and freely applied, are not, in general, those in which danger is chiefly to be apprehended; and it is probably to the conviction of this truth that we ought to attribute the gradual disuse of the most powerful method of applying cold in such diseases, the cold affusion.

The free use of saline medicines in fever has been lately recommended by Dr. Stevens and others, on the supposition that they have a peculiar or specific power of correcting the morbid state of the vital properties of the blood, which is indicated by its imperfect coagulation, and are therefore qualified to obviate the typhoid tendency in fevers; and it is certain that the indication which it is thus proposed to fulfil is one of real existence and importance, and that the effect of small quantities of saline matter, in accelerating the coagulation of fresh-drawn blood, would seem to favour the idea of its power to correct that morbid condition. But it is a mistake to suppose that the mere reddening of venous blood by salts is an indication of any such change on the vital properties of the blood, as would be requisite to make their use effectual for the purpose in view; experience of the saline medicines in fever does not authorize our attributing to them any peculiar power over the typhoid symptoms; and although the saline injections into the veins have frequently had an extraordinary temporary exciting effect in the stage of depression or collapse of the malignant cholera, yet the very frequent accession of coma, after that copious admixture of saline matter with the blood, will hardly justify the hope of any improvement as to that most formidable part of the typhoid symptoms resulting from the saline treatment.

We must still admit that the only medicines to which we can confidently ascribe a peculiar or specific virtue of controlling the morbid actions which constitute fever are bark and arsenic, when used in the intervals of intermittents; and the improvement in the administration of the former medicine effected by the introduction of the Sulphate of Quinine into general practice by Pelletier and other French pharmaceutical chemists, is one of the most important additions which chemistry has given to medicine during the period under review.

CHAP. III.

Recent additions to our knowledge of chronic diseases—1. Of organic diseases—Their diagnosis—Their arrangement and classification—Their connexions with each other and with acute diseases—Their treatment—2. Of functional disorders—Their connexions with one another—The general principles of their treatment—General reflexions on the past history and future prospects of medicine.

It will easily be understood from what has been already said, that some of the chief recent improvements in medical science will be found in the increased extent and precision of our information as to Organic Diseases, *i. e.* diseases dependent on permanent changes of structure in some of the organs. This department of medicine has likewise been studied with great care and minuteness by the French pathologists. It must be admitted that the diseases which are thus characterised are for the most part incurable; and that, most generally, it is only in so far as they are complicated, either with inflammation or with strictly functional disorders, that they admit of the applica-

tion of any remedies of more than palliative operation; yet the knowledge of their existence is frequently of practical importance; and when the information which we acquire from studying their symptoms in the living body, and their appearance in the dead, can be connected with the investigation of their predisponent and exciting causes, and the mode of their formation, it may be usefully applied, even at present, and we may trust will hereafter become more extensively applicable, to the *prevention* of evils for which the past history of medicine gives us little reason to expect that any medical treatment will ever supply a remedy.

The most important additions made to our knowledge of this class of diseases may be mentioned under the following heads:—

1. The diagnosis of them, during life, has been greatly improved by comparison of the symptoms, observed in many cases, with accurate investigation of the lesions discoverable on dissection. This, indeed, appears from what has been already said of the improved diagnosis of chronic inflammation and its effects, which, in many instances, are not to be distinguished during life, (otherwise than by their often abating, spontaneously or under remedies, more favourably,) from the more strictly organic diseases.

It is chiefly in the discrimination of chronic diseases of the thorax and abdomen, that the advantages of the methods lately brought into use may be observed. The observation of the functions which appear chiefly disordered is, certainly, in chronic as in acute cases, our first guide to the organ which may be judged to be affected; but this observation is sometimes deceptive, and often insufficient for such distinctions as may be confidently and usefully drawn. We now know that effusions, either into the cavity of the chest or into the air-passages, that morbid rarefaction, or morbid condensation of the substance of the lungs, (provided that a considerable amount of deposition has taken place in any individual portion of the lung,) or the formation of cavities within them, all modify the sound emitted by the chest on percussion, or the resonance of the voice from it, or alter, or add to, the natural respiratory murmur, generally or locally; and so produce peculiar symptoms, which, when existing alone, may be recognized by most persons without much difficulty; and even when combined, as so frequently happens, with one another, still frequently enable us to judge of the nature of complex cases with a degree of precision formerly unattainable.

The existence of enlargement of the heart and of dilatation of the aorta, and of obstruction to the transmission of blood through the heart, is in almost all cases distinctly discoverable by manual examination, connected with a few facts easily ascertained, as to the sense of palpitation and the manner in which it is excited; in some cases more specific information is obtained as to disease of the pericardium by percussion; and as to disease of the valves of the heart by the modifications of the natural sounds of the heart's action, perceived by auscultation; and the existence of aneurisms within the chest, otherwise imperceptible, may sometimes be ascertained in this way.

As an example of the increased precision of our knowledge of chronic diseases of the chest, we may instance the judgment which no careful observer will now hesitate to pronounce, on Dr. Cullen's definition of hydrothorax, comprising a number of symptoms which it is of great importance for the practitioner to observe, but none of which, singly or combined, do necessarily indicate that disease; and two of the most important of which, the starting from sleep with palpitation, and the sound of fluctuation in the chest, actually never attend the disease, unless it be complicated with others; while the symptoms most truly characteristic of the effusion into the chest, (the dull sound on percussion, and absence of respiratory murmur, altering their place on change of position,) are not mentioned in this definition at all.

It is true that much obscurity often attends the diagnosis of the more complex chronic diseases of the chest, even with all the aids that we now possess; and that to clear up this obscurity, in too many cases, would answer no practical purpose; but the statement that has been made of the improvements of diagnosis, as applicable to the simpler cases at least, since the time of Cullen, does not appear to be exaggerated.

It has been found that the existence of organic disease, giving an unnatural density to parts within the abdomen, may also be detected in some instances by aid of the sound emitted on percussion, (as practised by Piorry and others,) with more certainty than by the touch alone. Many organic changes of structure to which the different parts of the alimentary canal and the chylopoietic viscera in general are liable, have been carefully observed, and their symptoms (unfortunately some of them sympathetic and

remarkably various) been recorded; and the discovery of the connexion of organic disease of the kidneys with urine of low specific gravity and albuminous character, has enabled us to speak with confidence of the chief cause of derangement of the health in many cases which are otherwise extremely obscure. It is well observed by Andral that organic diseases of the liver, when, as often happens, they are neither made known by enlargement of the organ, nor by jaundice, nor even by any obvious deficiency of bile in the faeces, are at present more obscure than those of any other important viscera. The organic diseases of the testes, the prostate gland, and the urethra in man, and those of the uterus and ovaria in women, have been subjected, of late years, to repeated and careful inquiry; the symptoms which may excite suspicion of them are known, and detection of them by examination is seldom a matter of much difficulty.

As examples of the increased precision given to our knowledge of the variety of organic diseases, we may mention the accurate descriptions of those of the eye by Ware, Travers, Lawrence, and others in this country, as well as by many foreign authors; and, again, the minute discrimination of the diseases of the joints, as they originate in different textures, by Sir Benjamin Brodie; all which distinctions, in cases which are carefully traced from their commencement, may often be recognised.

2. Not only has much been done to enable us to pronounce, with more confidence than formerly, on the existence of organic changes of structure in various parts of the body, but the whole history of the changes which come under this description has been much elucidated by observation, both in the living and dead body.

Most of these depend on the deposition, and many ultimately on the ulceration, of adventitious or morbid matter of one kind or another, either substituted for or added to the original materials of the different textures; whether these are external and exposed to view, or internal, and to be recognised, partly by the functions which seem chiefly deranged, and partly by the modes of examination to which we have referred. From the time of Mr. Abernethy's Classification of Tumours, many minute descriptions of the great variety of these deposits have been attempted both in England and France, to some of which we shall presently advert; but it is perhaps impossible to embrace all these varieties in any formal arrangement. Probably the most successful attempt of the kind is that now in progress by Dr. Carswell, which affords a good illustration both of the increased accuracy of our knowledge of Morbid Anatomy, and of the advantage which is taken of the arts of the draughtsman and engraver, to diffuse and perpetuate that knowledge.

We have already spoken of the important practical question frequently presenting itself, how far an inflammatory action produced by the usual causes of inflammation may be concerned in determining their formation, and how far they must be referred to mere "perversion of nutrition" from unexplained causes. This question frequently occurs, and may be answered nearly in the same terms as to every variety of morbid structure, from the simplest morbid cysts or hydatids up to bony concretions, and scirrhouous or cancerous tumours; and the writings of Broussais, Laennec, and Andral shew the importance attached to it by modern French pathologists. All that can be said in regard to it in general terms is this, that effusions which are simply the effects of chronic inflammation may produce, probably in any part of the body, effects and symptoms almost exactly similar to those which result from the deposition of morbid matter, and the growth of adventitious textures; and that effusions, in the first instance produced by inflammation, may probably be gradually converted in different cases into any such morbid growths; but it is obvious that some additional condition of the morbid state must exist in every case where such conversion takes place: and experience instructs us, that when that unknown condition exists, all sorts of morbid degenerations of structure may be gradually effected, without either the application of the usual causes of inflammation, or the appearance of its usual symptoms.

There are two general grounds of distinction among adventitious textures or morbid growths, which are of obvious and practical importance, and have therefore fixed the attention of many pathologists, but which are often not easily recognised in individual cases, and are evidently not in all cases strictly observed by nature.

The first is the distinction of the diseases properly termed *malignant* from those which either become inert and stationary, or tend, however slowly, to a spontaneous favourable termination. When a decidedly scirrhouous tumour has formed in any part of the body, when a deposition of the nature of the Encephaloid matter or Medullary

Sarcoma has taken place, or when a sore has assumed the character of Hospital Gangrene, nothing but continually extending ulceration and ultimately exhausting constitutional disturbance can be expected; whereas the more common tumours, encysted or sarcomatous, on the surface of the body, polypi, of the common kind, on mucous membranes, fibro-cartilaginous tumours of internal parts, *e. g.* of the uterus, even the most common morbid depositions on the coats of the arteries, or valves of the heart, or in the substance of the liver or kidneys, although they may interfere with important functions, and so prove dangerous, are not necessarily destined in themselves to such unfavourable progress.

The other distinction is one which often points to the same conclusion, both as to prognosis and practice, but by no means coincides with the former, between those organic diseases which are *constitutional*, and those which are strictly *local*. We apply the former term to those formations which are known by experience to be found very generally in different parts of the body at once, and particularly in internal parts at the same time as in external; the matter composing which has been found also, by Langstaff, Velpau, and many others, in the blood within the vessels, chiefly in the veins leading from parts where extensive depositions have been going on, and of which it has been frequently observed that the removal of a limb, seriously affected by them, has been quickly followed by a rapid deposition of the same kind in internal parts. This character is so far applicable to the scrofulous tubercles, the whole history of which has been so fully elucidated by Stark, by Baron, Lloyd, and others in this country, and by Bayle, Laennec, Andral, Denis, Lombard, and others in France; but the latter particulars above stated have been found to apply more uniformly to two other kinds of morbid or adventitious structure, accurately described and distinguished only within the present century, and which are formed in general more rapidly than the scrofulous tubercles, viz. the medullary sarcoma, encephaloid disease, or fungus haematoës, and the melanosis; the first of which varies considerably in different instances, and has therefore acquired the above and various other names from Abernethy, Hey, Wardrop, Burns, Farre, Monro Tertius, and others who have described it within the last thirty years, in this country; while the latter is so very peculiar, that since it was described by Breschet, Laennec, and Beclard in France, and by Fawdington, Cullen and Carswell, and others in this country, there has been no difficulty in restricting the term to the proper description of cases.

In regard to these diseases, although we can point out several circumstances which seem to predispose to them, yet it seems obvious, from what has been very frequently observed in regard to them, that the circumstance which gives the strongest predisposition to the formation of any one of them in any part of the body, is the previous existence of the same morbid texture in another part, and that the chief cause of their formation is a constitutional peculiarity rather than a local irritation.

Many other kinds of morbid growths (particularly those which differ the least from the sound textures of the human body) have no such tendency to occur simultaneously or in succession in different parts of the body, and may therefore be more safely and advantageously removed in many instances where they have formed in external parts. The tendency to reproduction after the removal of an affected part is less uniform in the case of the scrofulous tubercles than of the other diseases now mentioned; but the great tendency to repeated deposition in internal parts is what, in fact, gives the great fatality to scrofulous disease, for individual tubercles are not uniformly destined to extension, or even to ulceration, and the epithet of malignant is, therefore, not strictly applicable to them. On the other hand, the tendency to reproduction after removal is very strongly marked in the true scirrhus after it has subsisted for some time in any part of the body, and particularly after any of the lymphatic glands have been affected by it; so that we must always expect that malignant form of disease, however strictly local in the first instance, to become constitutional shortly after it has discovered itself.

The facts stated as characterising the constitutional organic diseases seem to leave little room for doubt that they essentially depend on alterations of the constituents and vital properties of the blood; and that the peculiar matter of which they consist is, at least to a certain degree, elaborated in the interior of the vessels, and forms part of the circulating fluid, if not from the commencement, at least in the progress of the diseases. This principle is evidently illustrated by what has been already stated as to the evidence of purulent matter circulating in the blood in cases of inflamed veins, or of extensive

suppuration of other parts. And the dependence of such local depositions on a morbid state of the blood is farther illustrated by the facts observed in regard to the singular disease lately called Purpura, but long since accurately described by Dr. Duncan, sen. under the more characteristic term haemorrhœa petechialis; some cases of which, indeed, approach very nearly to those cases of melanosis where the morbid matter is most generally deposited.

The phenomena of Scurvy, strictly analogous to those of purpura, afford the only example yet known of an alteration of the vital properties of the blood, the essential cause and auxiliary predisposants of which are known, and the means of correcting which are equally simple and certain. The peculiar efficacy of the citric acid in particular, according to the statements of Sir G. Blane, seems well ascertained. But the absolute inefficacy of the same treatment in cases of purpura sufficiently indicates that similar conditions of the blood may result from various causes. Numerous recent observations on purpura have shewn that it is often complicated with inflammatory diseases, and then may admit of relief from antiphlogistic treatment,—a conclusion quite in accordance with what has been stated as to other diseases connected with a morbid condition of the blood.

There is yet another description of organic disease in which it is pretty certain that the morbid product is the result of vital changes which take place among the constituents of the blood in the interior of the vessels, viz. some of the fungous growths or vegetations which are occasionally found attached to the valves of the heart. From several cases, which he has himself seen, the present writer has no hesitation in agreeing to the doctrine of Laennec, that certain of those substances are not growths from the lining membrane of the heart, but coagula of blood, gradually forming and attaching themselves, and acquiring a peculiar organization.

There are many cases of disease in which organic lesions of the solids composing the animal frame are effected without the deposition of new or adventitious matter,—cases of atrophy, or hypertrophy, or alteration of the form and position of parts, leading in many cases to derangement of functions, or giving still more unequivocal indications of their existence, by alteration of the outward appearance of the body. These cases have likewise attracted the particular attention of pathologists; and what is most important in this department of pathology is, the distinct apprehension of the manner in which (consistently with known laws of the animal economy) many of these alterations of structure are effected, in consequence either of inflammations and effusions, or of other organic diseases, or even functional disorders, previously existing. Thus, atrophy of parts may often be traced to their disuse, and hypertrophy to their excessive use, in consequence of other disease, and both illustrate the dependence of nutrition on local changes occurring at the extremities of the arteries. The emphysema of the lungs already mentioned, and the enlargement of the bronchi, are naturally consequent on many cases of bronchitis and effusion into the air-passages, but constitute, when effected, important organic diseases in themselves. In like manner the common case either of dilatation or hypertrophy of the heart, so fully investigated by Corvisart, Laennec, Bouillaud, Andral, Baillie, Burns, Farre, Hope, and many others, is very seldom a diseased state in itself, but is the natural consequence, produced in a healthy part by obstruction to the exercise of its function, of disease (inflammatory or organic) of one part or other of the membrane lining the inside of the heart and aorta. So, also, the expansion of the cranium and unfolding of the convolutions of the brain in the chronic hydrocephalus is a consequence of the gradually increasing effusion of serum in its interior; the gradual conversion of the kidney into a cluster of cavities, communicating with each other and filled with fluid, is the natural effect of obstruction of the ureter, causing enlargement of the calices, and compression and absorption of the glandular substance; and the great alterations in the form and other qualities of bones, both in the mollities ossium and in the spina ventosa, appear to be, frequently at least, consequent on morbid growths from their internal or medullary membrane.

3. Not only the history of most of the organic diseases has been greatly elucidated, but the more general consequences which they produce, the predisposition which they naturally give to other diseases, and therefore their connexions, with inflammations, with functional disorders, and with one another, have in many instances been made out; and in a practical view, this is one of the most important inquiries concerning these diseases in which pathologists have lately been engaged.

Thus it is now well understood that the very common disease of the arteries, which begins by deposition of lymph on their inner membrane, and generally goes on to ulceration and irregular bony depositions there, is naturally the great predisposing cause of many and very different diseases,—that in the trunk and extremities it often leads to aneurism, and in the extremities it is often connected with gangrenous inflammation; that in the brain it often leads to rupture of vessels and apoplexy or palsy; that in the neighbourhood of the heart, and especially when the morbid deposits extend to the valves of the heart, it obstructs the circulation there, and leads to dilatation and hypertrophy, to palpitations, to fits of syncope, sometimes to angina pectoris; that the obstruction on the left side of the heart gives a great predisposition both to peripneumony and to rupture of bloodvessels, producing haemoptysis and apoplexy of the lungs, and seldom fails, sooner or later, to induce chronic bronchitis, with which, in certain constitutions, fits of spasmodic asthma are combined;—farther, that this as well as other causes of obstruction to the free flow of blood through the heart and lungs, producing habitual dyspnoea, leads naturally to congestion in the great veins, and thereby to enlargement of the liver; and that it is chiefly after the disease of the heart and arteries has already become complicated with disease of the lungs or liver, that dropsy, more or less general, is so apt to supervene. In like manner we can easily trace the connection, in many cases, of bronchitis and asthma with emphysema of the lungs and consequent habitual dyspnoea, and then with enlargement of the liver and dropsy;* or that of obstructed liver, first with dyspeptic symptoms, and then either with ascites, or with diarrhoea, dysentery, melæna, or haematemesis.

But in all these cases it is to be observed, that the pre-existing organic disease acts only as a great and permanent *predisposing* cause of the various derangements, functional or organic, which thus combine themselves with it. When existing alone, any one of these organic diseases may exist, at least in some individuals, for a length of time without causing any very urgent symptoms; and the occurrence of these complications may very often be ascribed also, in part, to the action of *exciting* causes of disease,—cold, intemperance, exertion, &c., and to inflammatory attacks connected with these. In fact it is chiefly by warning us of the specific dangers to be expected from such exciting causes, and of the importance both of avoiding them, and of watching for any fresh accessions of inflammatory symptoms, and using depleting remedies as early as possible to subdue them when they appear, that the knowledge of the usual successions of such diseases is useful.

4. The precision which is thus given to our views of the effects to be expected either from bloodletting or other evacuations in the varying circumstances of organic diseases, of the time when they should be used, the objects to be gained by them, and the circumstances in which no advantage can be anticipated from them, is certainly the principal practical improvement which has resulted from our extended acquaintance with the pathology of such diseases. In cases of dropsy, additional evacuant remedies, of the class of diuretics, particularly the digitalis and the pyrola, have been introduced within the last half century, and from the former, at least in many cases, very striking effects have been obtained.

Many hopes have been entertained, at different times, of the discovery of medicines possessed of a true and specific deobstruent or alterative power, but it must be admitted that these have been generally disappointed. At the same time it is probably going too far to say, in the words of Sir B. Brodie, that when any texture of the body has been altered from its natural condition by disease, that natural condition is never restored. We undoubtedly meet with cases where unexpected recovery from what appear to be the symptoms of unequivocal, although probably incipient organic disease of some of the internal viscera, takes place under the judicious use of mercury, or of the sulphureous and saline mineral waters, or of iodine; and we cannot regard the recommendations of these remedies and the rules for their administration, contained in many recent works, as practically unimportant, nor doubt of the introduction of the last named medicine, by Dr. Coindet, having been a real addition to the resources of medicine.

* When disease of the liver has been found connected with organic or habitual disease within the chest, it has been often supposed, in this country, that the former has been the primary disease; but the present writer is quite satisfied that the statement of Audral, as to the pre-existence of the thoracic disease, in most such cases, and the mode of production of the liver disease, is very generally correct.

But it must be admitted that the virtues of all these remedies have been much exaggerated by most of those who have undertaken to recommend them; that in a great majority of cases they are obviously quite inadequate to the object to be accomplished; that when they have succeeded, the morbid structures which existed have probably approached more nearly than is usual to the effects of simple chronic inflammation, and been obviated in part by the repeated although cautious use of the ordinary remedies for inflammation; that some of these remedies have injurious effects on the body which are often just objects of apprehension, (of which mercury in scrofulous habits is the most important example;) and that, in the present state of our knowledge, the discretion of the medical practitioner is very often most usefully exercised in withholding any such remedies, and confining himself to palliative treatment only, in cases which are truly beyond the reach of any alterative or deobstruent medicines yet known.

Important practical observations have been made by Sir Benjamin Brodie and others, on the diagnosis of those organic diseases of more external parts, especially of bones and cartilages, in which counter-irritation has proved most successful; but these are perhaps rather to be regarded as cases of chronic inflammation and its consequences than of strictly "perverted nutrition."

This is not the proper place to dwell on the surgical treatment of those organic alterations of texture which admit of relief from such means; but the great improvements in the treatment of aneurisms, of strictures of the urethra, of polypi of the uterus, and the use of various escharotics to destroy the surface of intractable ulcerations, as in the case of the arsenical solution applied to the hospital gangrene, of the nitric acid to phagedenic venereal sores, of the lunar caustic to the more common syphilitic ulcers,—even of different escharotics to incipient ulcerations of the os uteri, are all examples of the successful application of expedients of this kind, the proper use of which was formerly imperfectly understood.

The last class of diseases which may be noticed in this sketch of modern improvements in medicine is that where the functions of different organs only are disordered, without either inflammation or fever, or organic alteration of structure; and although this class is very numerous, and demands much of the care of medical practitioners, it need occupy only a small share of our attention at present; because the disorders which it comprehends are less accurately defined, their history is more various, the effects of remedies upon them are more uncertain, and the observation of their effects is liable to more fallacies; so that the information which we can acquire in regard to them cannot have the same character of precision as that which we possess in regard to those diseases of which the symptoms and anatomical characters are better marked and more uniform. In some instances, however, merely functional diseases have been described and distinguished of late years with a degree of precision formerly unknown and practically important.

The greater number of the functional derangements to which we here allude are included under the two heads of disorders of the digestive organs and disorders of the nervous system; but some cases of dropsies unconnected with perceptible organic disease, some cases of derangement of secretions unconnected with digestion, and many chronic affections of the bronchi, and of the surface of the body, may be held to belong to this class, as being derangements of secretions rather than either inflammatory or organic diseases.

Now it may be remarked of these diseases, that perhaps the most important general principle lately ascertained in regard to them, is that of the sympathetic connexion existing among them, and, therefore, the possibility of effectually correcting one disorder of this class by applying remedies, apparently, to another. Thus, the dependence of many disorders of the nervous system on imperfect digestion, and derangements of the bowels, not as the sole, but in many instances as one of the conditions of their existence, seems well established; and it is generally believed that the same principle extends to disorders of distant secretions, (*e.g.* to that disorder of the secretion of urine on which the formation of calculi depends,) and to many chronic cutaneous diseases. The Treatise on Purgative Medicines, by Dr. Hamilton, senior, and the Essay on the Constitutional Origin of Local Diseases, by Mr. Abernethy, have strongly impressed the practitioners of this country with the importance of careful attention to the state of the *principae viæ* in many cases, where the organs chiefly affected

appear to be distant from that source of irritation. It may be doubted, whether the remedies which have appeared so useful in the hands of these practitioners have always acted merely in the way they supposed; it may be doubted, for example, whether the purgatives used by Dr. Hamilton in chorea, in hysteria, or in threatening of hydrocephalus, have acted merely as evacuants of irritating matters from the bowels, or chiefly as *derivants* from the brain and spinal cord; it may be doubted whether the small doses of mercury prescribed by Mr. Abernethy in cutaneous ulcerations and other disorders of external parts, have acted merely on the stomach and bowels, or chiefly as alteratives on the whole system; and it is certain that in different states of the *præviae viæ*, different plans of treatment from those chiefly insisted on by those authors, will be found most effectual. Still, the general principle of correcting the functional disorders of other parts of the body, by the diet, regimen, and medicines, which most effectually improve and preserve the state of the digestive organs, is generally acknowledged as highly useful and important.

Another important observation lately inculcated by several practical authors, is that of the ready transition of functional disorder, when neglected or irritated, into inflammation, generally of the more chronic character, and the importance, therefore, of the antiphlogistic treatment in a number of cases, which, judging at least by their first symptoms, might be supposed to present no indications for loss of blood, or even for low diet. The writings of Dr. Cheyne and other recent authors on hydrocephalus, of Dr. Parry, of Dr. Wilson Philip on dyspepsia, and of Broussais and his followers, afford many illustrations of this observation; and as usual, when a principle previously neglected has been illustrated, this kind of practice has been carried too far by the last mentioned authors.

The attention of the profession has been properly fixed by several practical authors, of late years, on certain forms of disorder of the nervous system, which were not formerly distinguished with sufficient accuracy, and which demand the more attention as they often closely resemble the inflammatory diseases of the nervous system, although the most successful treatment of them is very different from that which true inflammations require. The Delirium Tremens, so accurately described by Pearson, Sutton, Armstrong, &c.,—and the power of opium, under proper management, in controlling it, is the most striking example. The accurate investigation of cases of spectral illusions and somnambulism or reverie is likewise of modern date. We may mention, also, the careful diagnosis of neuralgic pains, and the use of some remedies, of the class commonly called tonics, such as the carbonate of iron, recommended by Mr. Hutchinson, in their treatment; the dependence of many such disorders on morbid action at the roots of the sensitive nerves of the parts apparently affected, (which seems to be ascertained by the observations of different authors on what has been termed Spinal Irritation); and more especially the important observations of Dr. Marshall Hall, Mr. Travers, and others, on the state of excitement, resembling inflammatory fever, in certain constitutions, to which they have given the name of Reaction after the Loss of Blood; and again those of Dr. Abercrombie, Dr. Gooch, and others, on the symptoms closely resembling hydrocephalus in children, which are consequent on long-continued diarrhoea, or other evacuations, and abate under the use of stimuli.

It were tedious to enumerate the different individual medicines which have recently been proposed and approved by many practitioners in strictly functional diseases; but it seems important to remark, that the advantages to be derived in many chronic disorders unconnected with organic disease, from change of scene or of climate, from residence in the country, from the vegetable alteratives, as they have been called, such as the sarsaparilla, and from the saline, sulphureous, and chalybeate mineral waters, have been more fully appreciated of late years than formerly; and there is good reason for thinking that such remedies and regimen, acting primarily, or at least most obviously, on the organs of digestion, may often be effectual, not merely in correcting functional derangements, but in so restoring the natural vital properties of the blood, as to obviate the predisposition to organic disease, which might otherwise be gradually formed.

On the whole, in taking a general view of the different stages of improvement of medical science, it may be stated that the ancient physicians, entertaining the most inaccurate notions as to the functions of the body in the sound state, and as to the

essential nature of diseases, were yet enabled, by empirical observation, to acquire a surprising extent of accurate information, as to the external causes and natural progress of diseases, and as to the power of remedies over their most formidable symptoms. In more modern times physiologists have acquired a general knowledge of the nature of all those functions in which the visible movements of the body are chiefly concerned, and so far contributed to the elucidation of many diseases; while the distinctions of the different diseased states, so far as they appear during life, have been ably arranged and classified in the systems of Nosology; the application of remedies to them has been reduced to a more regular system than formerly; and the lists of really efficient remedies have been gradually curtailed, and their properties more accurately determined.

The great improvement of late years has been chiefly owing to the more diligent cultivation of morbid anatomy, whereby the localities, the varieties, and the natural effects (whether perceptible during life or after death,) of almost all the diseased states of the body have been more accurately ascertained. At the same time, by the improvements in physiology, the immediate causes of the fatal termination of diseases have been in most cases explained; and thus the immediate objects to be attained by medical practice have been more clearly defined, and additional precision given to the administration of remedies, the powers of which had been already established.

In looking forward to the farther improvement of the art, we can hardly expect that the most numerous class of remedies,—those which produce sensible effects on the body,—can either be made to exert more power, or be directed with much more accuracy towards the objects which they are capable of accomplishing, than they may be at present, by well-informed and judicious practitioners. Our hopes of the increasing usefulness and efficacy of our art must depend, partly on the improvement of medical education, and the more uniform diffusion, through the members of the profession, of the knowledge which we already possess; but partly, also, on the progress which may yet be expected in two lines of inquiry, in which our success has been as yet only partial,—*first*, in the discovery of Specifics, which may counteract the different diseased actions of which the body is susceptible, as effectually as the cinchona counteracts the intermittent fever, citric acid the scurvy, or vaccination the small-pox; and, *secondly*, in the investigation of the Causes of disease, whether external or internal; *i. e.* of the conditions under which, either the vital actions of the solids, or the vital properties of the fluids of the body, become liable to deviations from their natural state.

That the vices, and follies, and necessities of mankind will, throughout all generations, be a fruitful source of disease, as well as of other misfortunes, is as certain as that an origin of moral evil has, for mysterious purposes, been implanted in every human breast; but there is nothing irrational, or Utopian, or inconsistent with the past progress of human knowledge, in the hope that our knowledge of the causes and intimate nature of diseases may be gradually so extended, and our powers of resisting them so increased and defined, that human judgment and foresight may ultimately be found adequate either to prevent or relieve all the sufferings, which we now regard as necessarily attendant on our physical constitution; and therefore, the defect of those moral qualities, rather than ignorance of the laws of nature, be justly chargeable for all, as it already is for many, of those physical evils which it is the office of the physician to alleviate.



